FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 1141. (Vol. XXII. No. 45.) NOVEMBER 7, 1930 [**Weekly, Price 6d. Post free, 7½d. Abroad, 8d.**

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.

Telephone: Editorial, Holborn 1884. Advertising, Holborn 3211.
Telegrams: Truditur, Westcent. London.

Annual Subscription Rates, Post Free.

United Kingdom .. 33*s.* 0*d.* United States .. $8·75
Other Countries .. 35*s.* 0*d.**

**Foreign subscriptions must be remitted in British currency.* (*See last Editorial Page*).

CONTENTS

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1930

Nov. 7 .. Northamptonshire Ae.C. Annual Ball, Salon-de-Danse, Northampton.
Nov. 12 .. Cinque Ports F.C. Annual General Meeting.
Nov. 12 .. "Work of the Air Force in Aden," R.U.S.I. Lecture, by Sqdn.-Ldr. the Hon. R. A. Cochrane. 3 p.m.
Nov. 13 .. "Testing the Control of Aeroplanes," Lecture, by H. L. Stevens, before R.Ae.S
Nov. 13 .. "Triplex Glass Making," Lecture, before Westland Aircraft Soc.
Nov. 14 .. Central Flying School Reunion Dinner at Jules', Jermyn Street, London.
Nov. 20 .. "Recent Developments in Engine Cooling," Lecture, by Capt. H. Swan, before R.Ae.S.
Nov. 20 .. "Aircraft Detail Design—The Shops' Viewpoint," Lecture, by W. G. Gibson, before Westland Aircraft Soc.
Nov. 25 .. Norfolk and Norwich AeC. Annual Ball, Andrews Hall, Norwich.
Nov. 28 .. "Importance of the Boundary Layer," Lecture by H. Glauert, before R.Ae.S., Hull.
Nov. 28 .. "Wapiti in India," Lecture, by Gr.-Capt. R. H. Verney, before Westland Aircraft Soc.
Dec. 4 .. "The Four-Foot Wind Tunnel," Lecture by H. Glauert, before R.Ae.S.
Dec. 5 .. "Recent Long-Distance Flights," Lecture, by Capt. C. D. Barnard, before Westland Aircraft Soc.
Dec. 11 .. "Axial Engines," Lecture by M. L. Bramson, before R.Ae.Soc.
Dec. 11 .. "Float and Boat Seaplanes," Lecture, by Mr. Jackson, before Westland Aircraft Soc.
Nov. 28-Dec. 14 Paris Aero Show.

EDITORIAL COMMENT

THE past few months have seen a number of tragic air accidents, including the loss of R 101, which have certainly shocked the public. Both civil and service aircraft have been involved, and the causes have been various. A number of accidents in a short time inevitably produces a cumulative effect. It is almost inevitable that humanity in general should be more inclined to let its mind dwell upon the total than to give proper emphasis to the different classes of accident. Civil accidents and service accidents are in two different categories.

Air Accidents

Accidents in landing are different from accidents in the air. An accident in which circumstances proved too much for the pilot is different from one which could have been avoided by better judgment and skill on the pilot's part. In a separate category should be placed all those accidents when the pilot ought to have refused to take off at all in the prevailing weather.

If we divide accidents primarily into civil accidents and service accidents, we see at once that further subdivision becomes necessary. In the Royal Air Force a higher percentage of accidents must always be expected than would be admitted as normal in civil flying. A young man who applies for a commission in any fighting service starts with a readiness to risk and lose his life in time of war. He must also be prepared to risk it in training for war. In one of our most historic arms, the cavalry, no officer and no trooper would be highly esteemed who hesitated to risk his neck by galloping across country. The submarine branch of the Navy may be popular, but it is hardly so likely to promote long life as is, say, agricultural labour. We should have no Air Force at all if the chief ambition of every young man was qualification for an old-age pension.

Even in the Service, however, there are degrees of risk. In a day-bomber squadron, for example, there should be no temptation to disregard the claims of safety. The worst risk run by a night-bomber should be a forced landing by night. It is usually thought that the risks in a fighter squadron must be the

greatest. We can see no reason why they should be so if every fighter pilot combined in his character an equal admixture of daring and caution. Such a nice balance is rare in human beings. In the fighter pilot great skill and daring (qualities which are often found together) are essential. The caution is not a *sine qua non*, and so it is only too often conspicuous by its absence.

Turning to civil flying, there is no obvious reason why an accident should ever occur on an organised air service. Pilots are carefully selected and are very experienced. The watchword of their work must be, and usually is, not "Daring," but "Caution." They get to know their route or their stage so thoroughly that good visibility becomes a matter of minor importance. In working an organised route, the ground organisation can be so highly developed that the difficulties of the pilot are reduced to a minimum. In fact, for the greater part of the time the airways pilot has no need for exercising the same sort of skill as the service pilot.

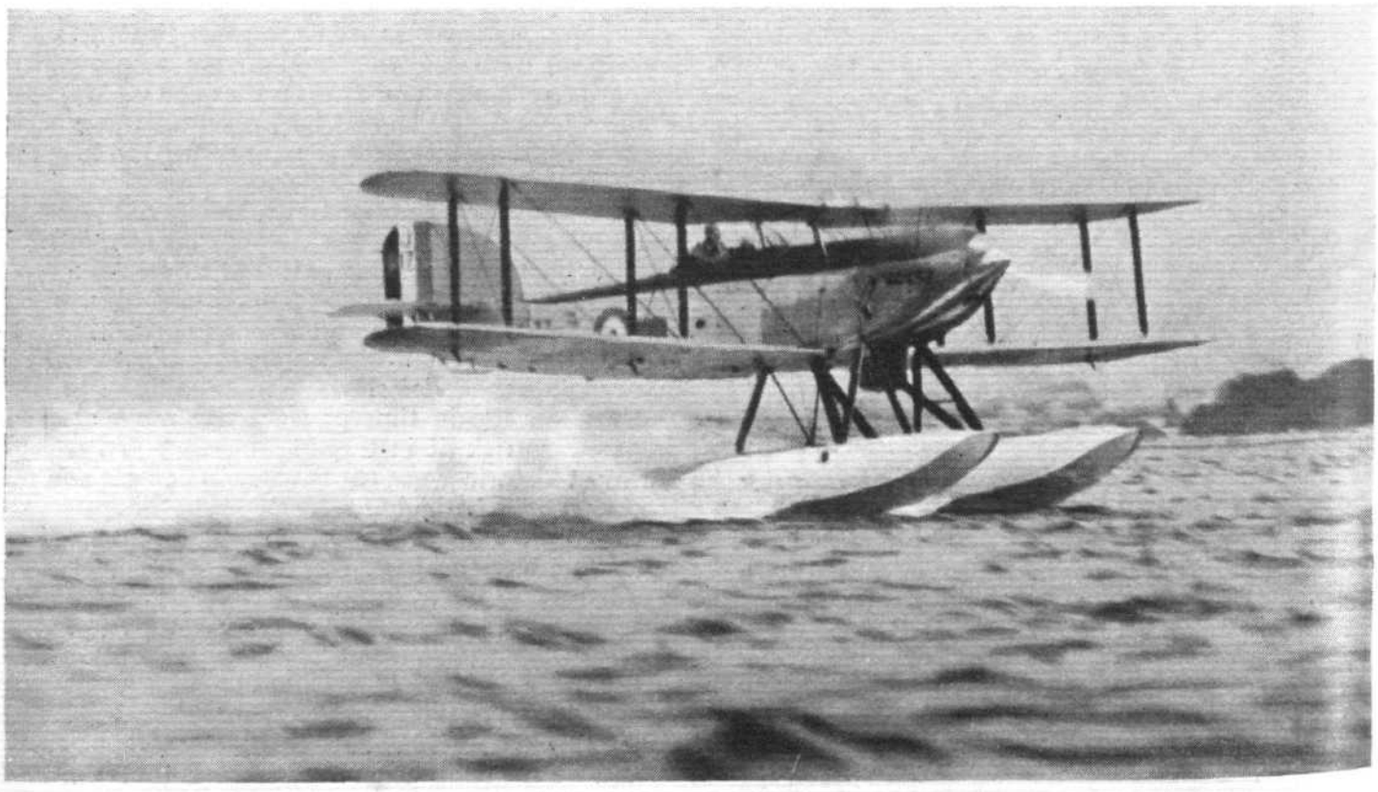
The only weak point on some airways is the vexed question of reserve engine power. A flying company has to earn money, and consequently the temptation is great to regard the pay-load factor of any aircraft as of prime importance. Reserve engine power reduces the pay load, and as a result directors are tempted to reduce the amount of the reserve power. It is here that it seems to us that higher authority might with advantage assert itself. If the chosen way to avert accidents is by adopting the multi-engine principle, then it would be possible for the Government which provides the subsidy to insist upon the complete superfluity of one engine. When the time comes for the grant of mail contracts, we feel sure that the terms of the contract will make such a development an absolute necessity. The contract terms may not insist, in so many words, on one superfluous engine. More probably the penalty clause for late arrival will be so stringent that no operating firm will dare to take any risk whatever of delay. What can be insisted on in the case of mails ought also to be insisted on where the lives of passengers are at stake.

Fortunately, accidents on organised British air routes are rare. Accidents in private flying are unfortunately less rare. It is quite as hard to enforce cautious behaviour on private pilots as it is to enforce it on private motorists. The air has not yet become so dangerous as the road, but it looks as if the risks of the two will be levelled up before many years have passed.

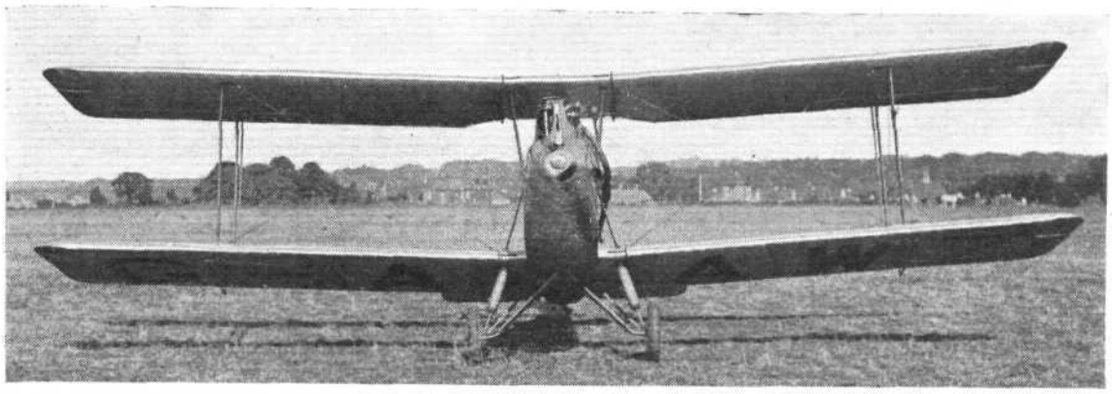
The crux of the problem, then, seems to be the lack of caution and lack of skill in certain classes of service pilots and private pilots. There is no sovereign remedy. Instructors can do a good deal, and it is incumbent upon them to do all that they can to impress their pupils with the need for caution. The freedom of the Oxford and Cambridge University squadrons from serious accidents shows what can be done when the right type of instructor is working with the right type of pupils. When a pupil is not of the right type and shows a tendency to foolhardiness, the instructor is all the more under an obligation to correct this tendency. He will be judged by the way in which his pupil behaves after getting his licence.

In the Royal Air Force, authority and discipline are able to do a great deal which cannot be done in civil flying. We sometimes wonder whether reckless flying by a service pilot is always met with a punishment which fits the crime.

One point, at any rate, ought to appeal to all pilots, service or civil; and that is that every accident serves to discredit the cause of the air in the eyes of the public.



A FAIREY IN CANADA: One of the Fairey III F seaplanes, fitted with a Series XI Napier "Lion" employed by the Royal Canadian Air Force at Vancouver. The machine is seen taking off at Jericho Beach.
(Photo Royal Canadian Air Force.)



THE SPARTAN "ARROW"

A New Two-Seater with Good Climb

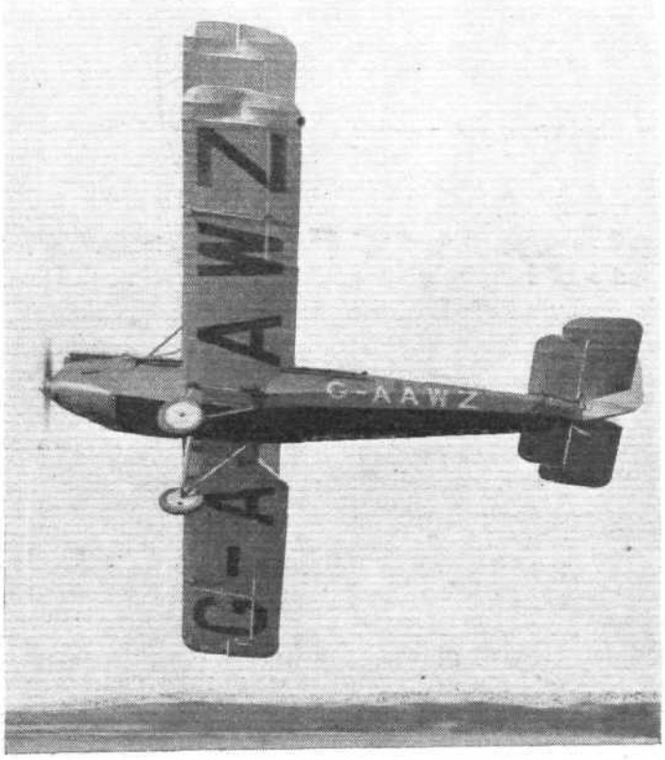
WHEN, some years ago, Mr. O. E. Simmonds established his own aircraft firm, he did so on the strength of a very ingenious scheme whereby was attained a degree of interchangeability never before attempted. By this scheme, use was made of wings of symmetrical aerofoil section, which made it possible to use one spare wing in any of four positions: Top right-hand, bottom right-hand, top left-hand and bottom left-hand plane of a biplane. Struts, bracing wires and fittings were so designed that they could be attached to either side of the wing, and the same system of interchangeability was extended to ailerons, elevator flaps and rudder. For example, a portion of the elevator flap was identical with the horn-balanced rudder. Similarly, in the undercarriage the right-hand half could be turned around and used on the left-hand side and *vice versa*. One spare wing bracing wire could be used in any position in the wing structure.

The reduction in the number of spare parts which a club or a private owner needed to stock was, therefore, very considerable, and it might have been thought that such a system would have a strong appeal. While this was undoubtedly so, the fact that the whole scheme was based upon the use of a symmetrical aerofoil section has, in practice, proved to be something of an obstacle to complete success. Certain machines using symmetrical wing sections have been found to be rather vicious in a stall, flicking into a spin as soon as the stalling angle is reached. It is by no means certain that this is an unavoidable feature of the symmetrical section wing, but a good deal of prejudice undoubtedly grew up, and as a result, there were many who looked with suspicion on a machine with such a wing section. The fitting of Handley Page automatic slots would cure any tendency a machine might have to go into a spin, but some purchasers prefer aircraft without slots, and it is for such as these that Spartan Aircraft, Ltd., have produced the new version of their machine, the "Arrow."

Apart from the fact that in the Spartan "Arrow" a non-symmetrical wing section of greater lift has been adopted, the performance has been further improved by increasing the wing span and thus reducing the induced drag at low speeds. The combination has resulted in a considerable improvement in take-off and climb, both of which are very good in the "Arrow," as will be seen from the fact that, at aerobatic gross weight, and with the "Gipsy II" engine, the take-off run is only 60—80 yards, while the initial rate of climb is 830 ft./min. Even when the machine is loaded up to its somewhat remarkable "normal" gross weight of 1,750 lb., the take-off is only 100—130 yards, while the initial rate of climb is 700 ft./min.

It might have been thought that the use of a non-symmetrical wing section would preclude the features of interchangeability, which the earlier Spartan machines possessed, but actually the majority of interchangeable parts have been retained in the "Arrow," although in a slightly modified form. To those who knew Mr. Simmonds when he first started manufacture, this will not come as a surprise, and the writer of these notes recollects that when discussing the subject some years ago with Mr. Simmonds the possibility was mentioned of using one spare wing, not of symmetrical section, in any of the four positions in a biplane. Thus, the arrangement adopted in the "Arrow" is not, as it were, an afterthought on the part of Mr. Simmonds. On the contrary, it was foreseen several years ago, and is, we believe we are right in saying, a part of the original patent.

As far as the wings are concerned, the system adopted in the Spartan "Arrow" consists in slightly modifying the shape of a well-known aerofoil section in such a manner that the rear portion, from the rear spar to the trailing edge, is symmetrical, and in using a wing tip which forms a detachable unit, so that it can be placed at either end of the rectangular portion of the wing. By this means the spare or "key" wing can be used in either of the four positions on the biplane. To do so it is not, of course, "turned upside-down," as was the spare wing of the earlier Spartans, but the end which is nearest to the fuselage or top centre-section on one side of the machine becomes the outer end when the spare wing is used on the other side. The complication is just a little greater, but as the detachable wing tip is a small light structure costing, figuratively, a few shillings, this is no great drawback. That the interchangeability is not obtained in the "Arrow" at the expense of a great increase in structure weight seems to be proved by the fact that the tare weight is, with the "Gipsy II" engine, 965 lb., while the maximum permissible gross weight for the "Normal" category of the Certificate of Airworthiness is 1,750 lb. This gives a ratio of gross to tare weight of 1·814, which seems to point to very efficient structural design.



AN UNDERNEATH VIEW: The Spartan "Arrow" flying at Hamble. (FLIGHT *Photo.*).

General Description

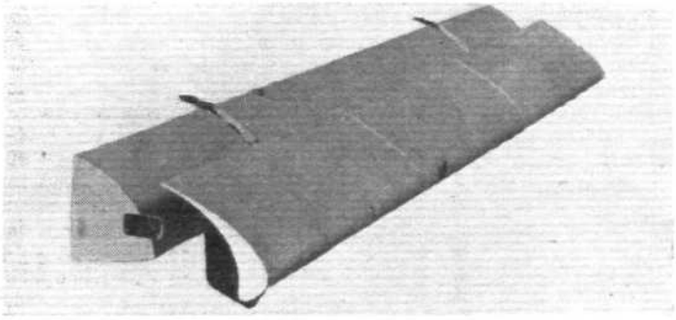
The Spartan "Arrow" is, in its general design, a normal

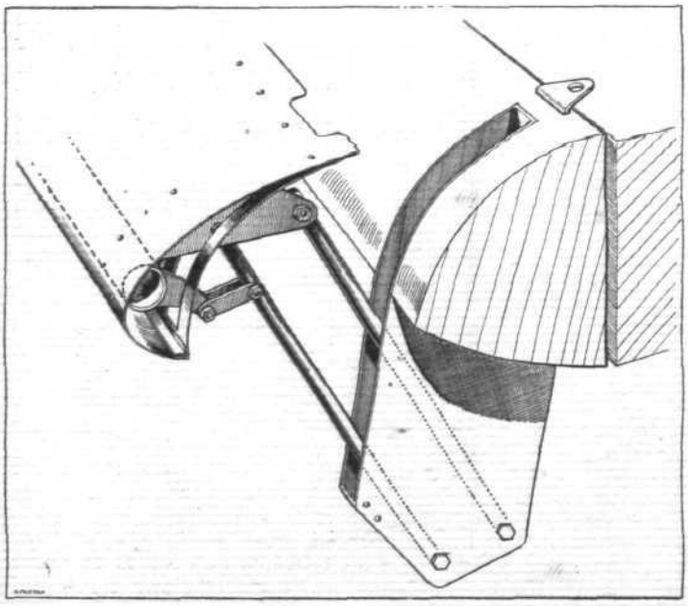
THE SPARTAN "ARROW": Three-quarter front view. The engine is a "Gipsy II." (FLIGHT *Photo.*)

single-bay two-seater biplane, and a superficial examination does not reveal any very unorthodox features. When, however, one has the opportunity to see the machines being manufactured and assembled at the Weston works of Spartan Aircraft, Ltd., the ingenious way in which many details have been thought out becomes apparent.

The fuselage is of all-wood construction, *i.e.*, a light skeleton of longerons and struts, covered with three-ply planking. The "lines" of the fuselage are pleasing to the eye, and convey an impression of slimness which is a little surprising after one has sat in the cockpits and found them particularly roomy. This impression of roominess is probably a result of careful lay-out rather than of actual dimensions, but the comfort is there, and is enhanced by the fact that the coamings and windscreens have been so shaped that both cockpits are particularly free from draught. Large side doors make access to the cockpits very easy, and as there is a very large luggage locker behind the rear cockpit, the owner of an "Arrow" is in a position to tour in comfort carrying with him all necessities for quite a prolonged tour.

The nose of the "Arrow" has been so designed that quite a variety of engines can be fitted, and the purchaser has a choice, including the "Gipsy I," the "Gipsy II," the





THE SLOT UNIT: The photograph shows the complete unit, while the sketch illustrates the torque tube which ensures parallel opening of the slot. (FLIGHT *Sketch and Photo.*)

SPARTAN "ARROW"

Dimensions

	ft. in.	metres
Length o.a.	25 0	7·62
Wing span	30 7	9·32
Height	9 6	2·89
Total wing area	251 sq. ft.	23·3 sq. m.

Weights

	lb.	kg.
Tare weight	965	438
Fuel (22 gallons)	167	75·9
Oil (2½ gallons)	25	11·4
Useful load	403	183
Gross weight	1,560	710
Wing loading	6·22 lb./sq. ft.	30·5 kg./sq. m.
Power loading	13 lb./h.p.	5·9 kg./CV.

Performance

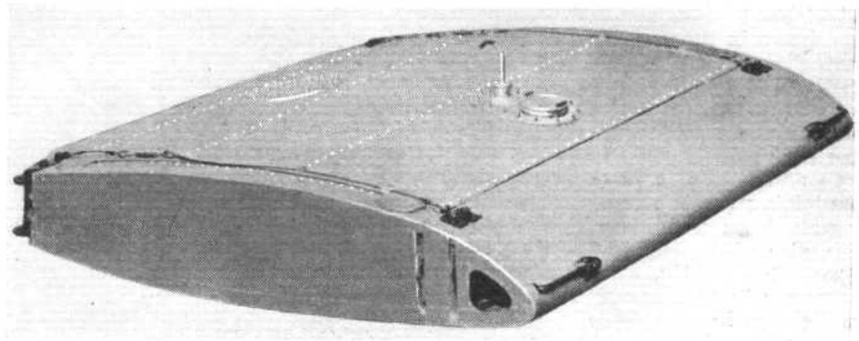
Maximum speed	106 m.p.h.	171 km./h.
Cruising speed	92 m.p.h.	148 km./h.
Stalling speed	38 m.p.h.	61 km./h.
Take-off run	70 yards	63 m.
Landing run	90 yards	81 m.
Initial rate of climb	830 ft./min.	4·22 m./sec.
Time to 5,000 ft. (1,525 m.)	7½ min.	
Range (22 gallons)	280 miles	450 km.
Range (34 gallons)	432 miles	695 km.

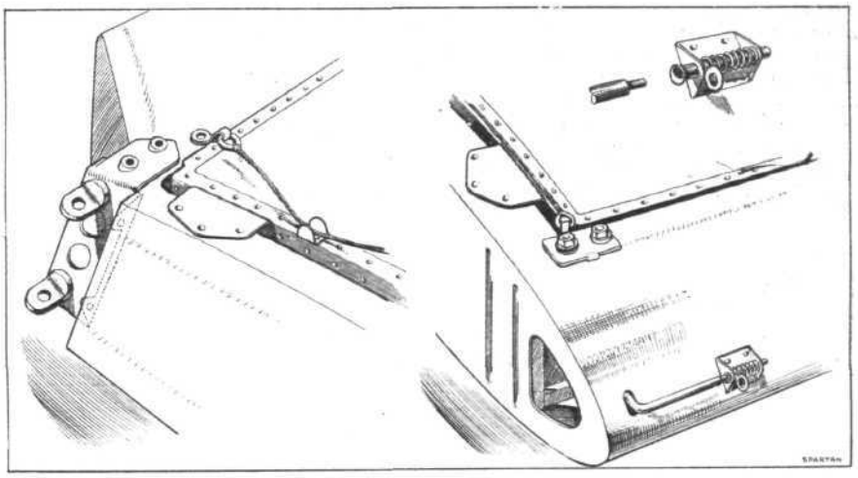
These weights and performance figures refer to the "Gipsy II" engined machine at a gross weight of 1,560 lb. With the same engine, but at "Normal" C. of A. gross weight of 1,750 lb. (796 kg.), the tare weight, fuel and oil remain unaltered, but the following items are substituted: Useful load, 593 lb. (270 kg.). Wing loading, 6·98 lb./sq. ft. (34·2 kg./sq. m.). Power loading, 14·58 lb./h.p. (6·6 kg./CV.). Max. speed, 104 m.p.h. (168 km./h.). Cruising speed, 87 m.p.h. (140 km./h.). Initial rate of climb, 700 ft./min. (3.56 m./sec.).

"Cirrus-Hermes" or any other engine of similar type and of approximately the same power. Presumably it would be possible to instal the inverted Gipsy ("Gipsy III") should a purchaser so desire, although as far as we are aware this engine has not so far been used in the "Arrow." The petrol system is of the usual gravity type, with a tank mounted in the top centre-section. This tank does not project beyond the wing contour of the centre-section, but is flush with it. A sketch on this page shows how the tank is neatly mounted and housed, and yet capable of being removed in a very short time.

Normally a tank of 22 gallons (100 litres) capacity is fitted as standard, this giving a range at cruising speed of approximately 300 miles, more with certain engines and a little less with others. This range is usually sufficient, at any rate for touring in the British Isles and to the nearer portions of the Continent. If, however, an owner desires greater range for tours to the distant parts of Europe or beyond, another size tank has been standardised, with a capacity of 34 gallons (155 litres). With most of the power plants likely to be used, this capacity will give a range of from 400 miles to something over 500 miles, according to the engine and gross weight of the machine.

The undercarriage of the "Arrow" is generally similar to the type used so successfully on the earlier Spartans. The two sides are interchangeable, and the telescopic leg is of long stroke, so as to give good shock-absorption qualities. The telescopic leg is attached at its upper end to an eyebolt through the front spar of the wing root, and a short strut runs from the top of the spar to the top longeron. The eyebolt through the spar has a sleeve around it which relieves the actual spar of compression stresses. In a minor crash, or a *very* bad landing, it is only the eyebolt which suffers, and possibly the steel plate on the under side of the spar, and repairs are confined to the replacement of the eyebolt and plate.





THE VERY NEAT PETROL TANK: The photograph shows the centre-section with tank in place, while the sketches illustrate the fastening of the tank, and also the locking of the pin used in the wing folding. (FLIGHT *Sketches and Photo.*)

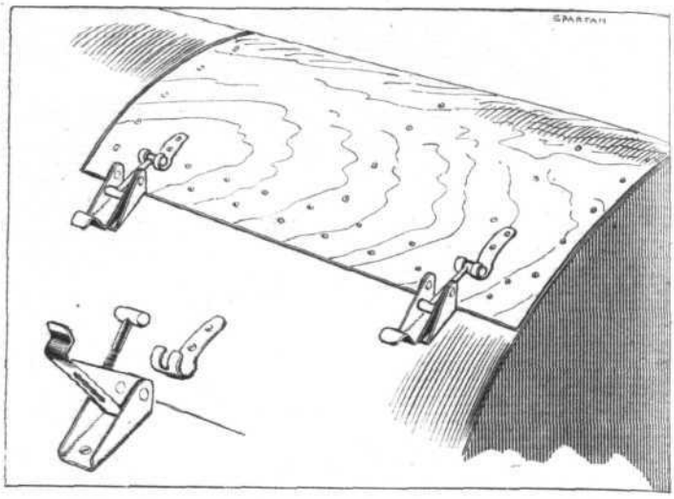
Wing Interchangeability

It is in the wing structure of the "Arrow" that the main difference between this machine and earlier types is found. As already mentioned, the use of a non-symmetrical wing section has made the usual Spartan system inapplicable, but the difficulty has been overcome in a most ingenious way. The wing structure as such has not been altered, *i.e.*, the spars are I-section spruce beams, and the ribs are Warren girders. But the trailing edge and wing tips have been designed with a view to making an interchange possible. The sketch on the next page, purely a diagrammatic one, indicates the system. The trailing edge of the wing section has been very slightly modified from the standard so as to make the portion from the rear spar to the trailing edge symmetrical. This trailing portion of the wing is made in two halves of identical length, and the two halves are secured to the rear spar by the same type of hinge, the exception being that the leading edge of the fixed trailing edge portion is flat and vertical, while the aileron leading edge is bevelled to allow of aileron movement. The "key" wing, exclusive of trailing portion, is of plain rectangular plan form, and the strut fittings are so designed that they can provide strut anchorage on top or bottom of the wing at will. If, for example, the spare wing is to replace a broken bottom

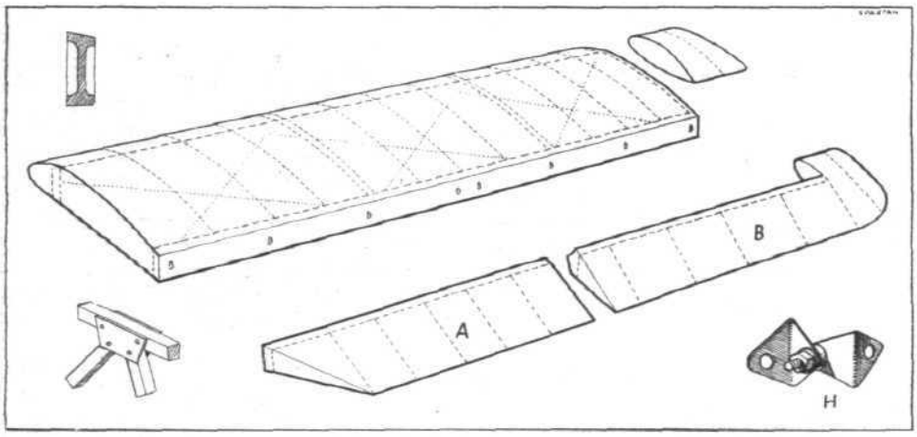
THE SPARTAN "ARROW" (GIPSY II): This Side View illustrates well the pleasing lines of the machine. Note that the rudder is of a shape quite different from that of the older Spartans. (FLIGHT *Photo.*)

right-hand wing, the two trailing edge portions are put on as shown in the sketch, and the wing tip (a separate unit) is attached to the right-hand end of the wing. The strut fittings are placed on top. If the wing is wanted, on the other hand, to replace a top left-hand wing, the fittings are placed under the wing, the fixed trailing edge portion A is turned upside-down (hence the need for its being symmetrical) and bolted in place at the right-hand end of the wing (adjoining the top centre-section), and the aileron is turned upside-down and hinged to the left-hand end. The wing tip, also of symmetrical section, is also reversed and put on the left-hand tip. In this way the interchangeability is very nearly as thorough as in the Spartans, but achieved in a slightly different manner.

In view of the increasing popularity of Handley Page automatic slots, provision is made in the "Arrow" for fitting these, if desired by the purchaser. The interchangeability is extended even to the slots, and Mr. Simmonds has evolved a very neat scheme for slotting the "Arrow." The entire slot mechanism is made up as a separate unit, in the manner shown in the sketch and photograph, on page 1208. To avoid one end of the slot opening before the other a torque tube is incorporated in the system, joined by cranks and links to the link members of the slot, as shown in the sketch. In the unslotted machine a plain leading edge unit is attached in the gap in the wing, and if the owner of an unslotted machine later decides to fit slots, he does not require new top planes, but merely removes the plain leading edge units and substitutes the slot units.



A NEAT CLIP : The sketch illustrates the clip on the door of the luggage locker, but the same type of clip is used elsewhere. (FLIGHT *Sketch.*)



INTERCHANGEABILITY : This diagrammatic view shows how the two parts, A and B, of the trailing portion of the wing can be used in any position. The wing tip can be fitted at either end of the wing. The type of hinge employed for the aileron and trailing edge is shown at H, while the two smaller insets show a spar section and the construction of a wing rib. (FLIGHT *Sketches.*)

Apart from the thought given to interchangeability, the designers of the Spartan "Arrow" have devoted much attention to the subject of maintenance and general ease of handling and upkeep in service. The machine is of robust construction, with few and simple parts, and such parts as are at all likely to need renewal periodically are designed for easy replacement. One-man handling has not been overlooked either, and the manner of locking the wings to the fuselage for folding has been so arranged that the pilot can, without assistance, perform the operation of folding. The catch which secures the lower wing to the fuselage is provided with a cable running forward where it can easily be reached, and the pilot can fold and spread the wings without leaving the vicinity of the undercarriage.

Various Engines

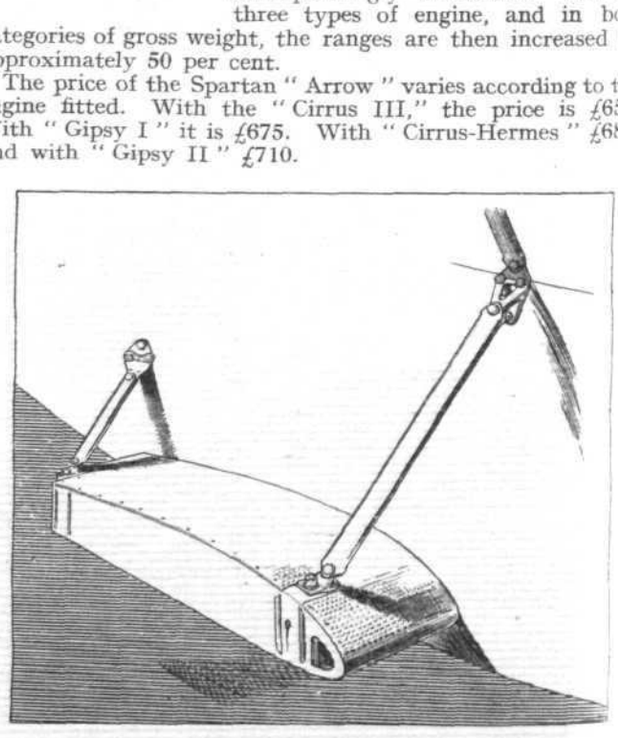
It has been mentioned that a range of power plants are available for the "Arrow." In the table of data on page 1208, the figures relate to the machine with "Gipsy II" engine. If the "Gipsy I" is fitted, the tare weight is reduced to 950 lb. (432 kg.), the useful load becomes 608 lb. (276 kg.) in the "normal" and 418 lb. (190 kg.) in the "aerobatic" category, while the gross weight in the two categories remains as before, 1,750 lb. and 1,560 lb. respectively. At aerobatic gross weight the top speed is 100—102 m.p.h. (163 km./h.), the cruising speed 85—88 m.p.h. (140 km./h.), and the initial rate of climb 670 ft./min. (3·4 m./sec.). At normal gross weight the figures become: Top speed, 98—100 m.p.h. (160 km./h.). Cruising speed, 80—83 m.p.h. (133 km./h.). Initial rate of climb, 530 ft./min. (2·7 m/sec.).

If the "Cirrus-Hermes" engine is fitted, the tare weight becomes 975 lb. (443 kg.) and the useful load, 583 lb. (265 kg.) and 393 lb. (180 kg.) in the normal and aerobatic categories respectively. The top speeds in the two categories are 101—103 m.p.h. (165 km./h.) and 103—105 m.p.h. (167 km./h) respectively, and the corresponding cruising speeds, 82—85 m.p.h. (135 km./h.) and 87—90 m.p.h. (142 km./h.). The corresponding rates of climb are 630 ft./min. (3·2 m./sec.) and 770 ft./min. (3·9 m./sec.).

The ranges, with normal tank of 22 gallons (100 litres) capacity: "Gipsy I" engine, normal gross weight, 330 miles (530 km.). Aerobatic gross weight, 350 miles (565 km.). "Cirrus-Hermes" engine, normal gross weight, 302 miles (485 km.). Aerobatic gross weight, 320 miles (515 km.).

If desired, a larger tank of 34 gallons (155 litres) capacity can be fitted, the useful load being then, of course, correspondingly decreased. For all three types of engine, and in both categories of gross weight, the ranges are then increased by approximately 50 per cent.

The price of the Spartan "Arrow" varies according to the engine fitted. With the "Cirrus III," the price is £650. With "Gipsy I" it is £675. With "Cirrus-Hermes" £685, and with "Gipsy II" £710.



ON THE SPARTAN "ARROW": The new lower plane wing root is braced from the fuselage, with which it is integral, by two struts. (FLIGHT *Sketch.*)

COMPLETING THE FAMILY

Some Recent Additions to the Armstrong-Siddeley Range of Engines

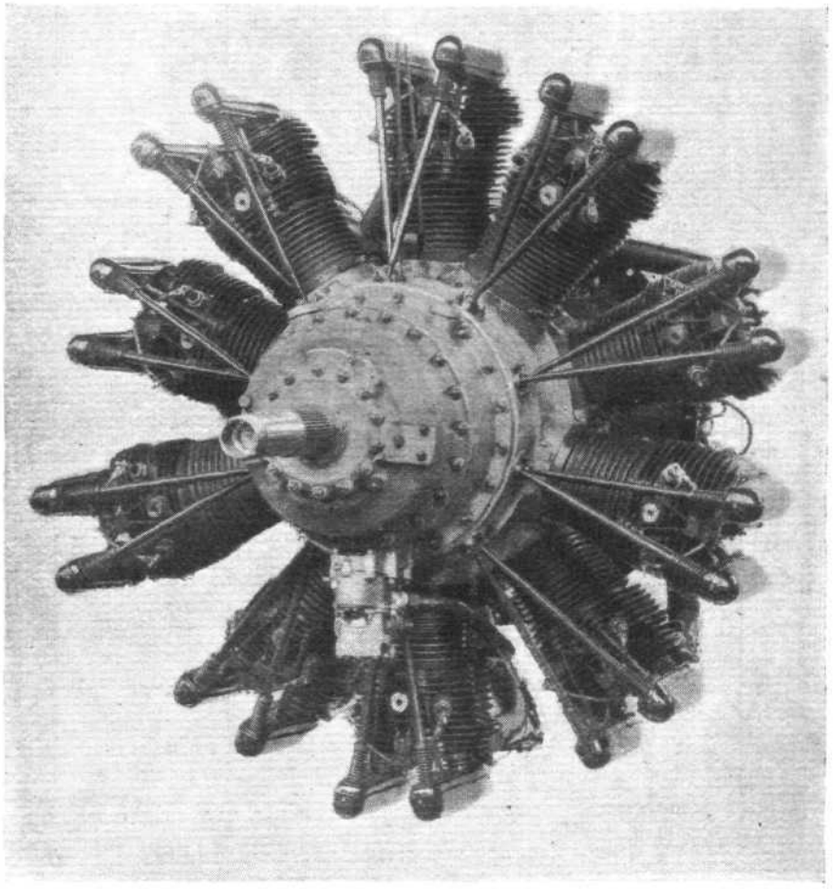
ARMSTRONG-SIDDELEY have recently put into production four new engines which fill what might have been considered as gaps, though not very serious ones, in their already comprehensive range of air-cooled radial engines. As may be seen from the chart on p. 1212 the family is now as complete a one as any aero engine manufacturer in the world has to offer. It should be observed how the ascending power scale progresses in easy and regular steps from the tiny five-cylinder 80-h.p. Genet to the 14-cylinder 800-h.p. geared Leopard, the most powerful as yet, we believe, of any type of air-cooled engine.

The new engines, indicated by underlining on the chart are, in order of power, the 7-cylinder Genet Major, the Lynx Major, the Double Mongoose and the Jaguar Major, or Panther as it is sometimes called. Dealing first with the Major Series, the forerunner of which, the Genet Major, was exhibited at Olympia last year, these engines are generally similar to their prototypes but have, in each case, a $\frac{1}{4}$ in. increase in bore.

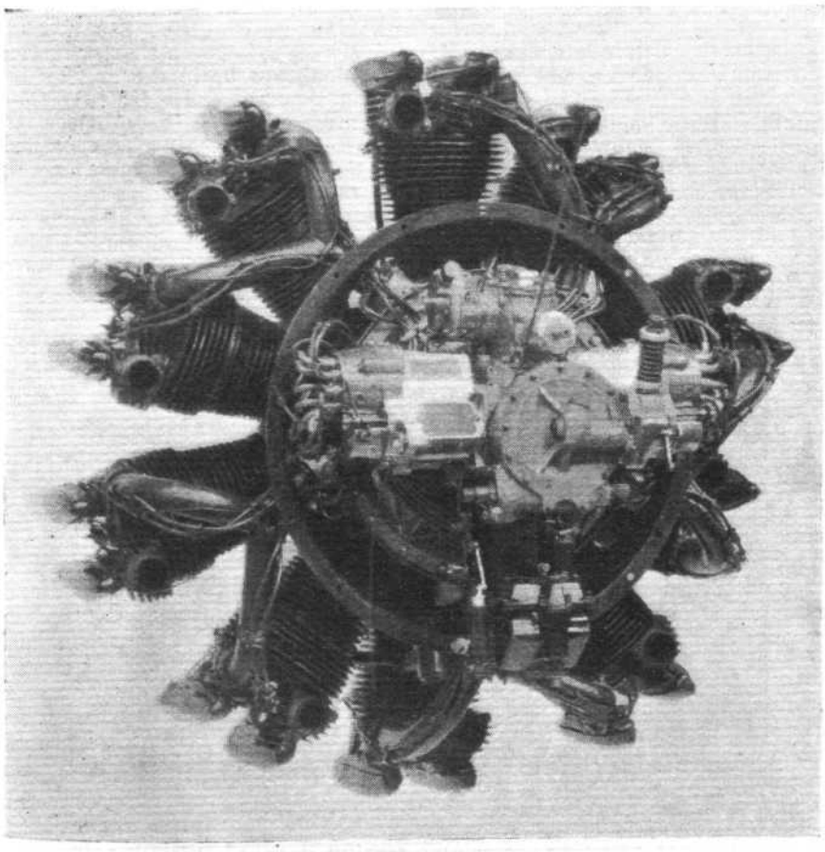
The stroke remains the same as previously and with the exception of the Genets these engines are fitted with a geared induction fan, which provides a ground boost or moderate supercharge of about 10 per cent. It is unnecessary to use a gated throttle control with these engines.

A fully supercharged Jaguar Major is also available, the geared fan being replaced by a high-speed rotor type supercharger unit of similar design to that employed on the earlier Jaguar engines and as supplied to the R.A.F. in Siskin aircraft. The airscrew shaft of the Jaguar Major is driven through the usual type of Armstrong-Siddeley reduction gear giving a ratio of 0·657 : 1, which permits a normal crankshaft speed of 2,000 r.p.m. The Lynx Major also has a normal speed of 2,000 r.p.m., but the airscrew shaft is direct driven, this also being the case in both Genet Major engines. In each case the power of the engines of the Major Series is approximately 20 per cent. above that of their respective prototypes. The cylinders of the Lynx and Jaguar Major Series are interchangeable as previously. The driving gear of the induction fan of these engines is generally similar to that of the supercharger rotor, *i.e.*, a lay shaft and a compound gear train is employed, the drive being transmitted through phosphor-bronze clutch segments in the gear wheels as previously, but in the case of the geared fan one lay shaft and one group of gears only is employed instead of the three groups employed in the supercharger drive. As the ratio is only of the order of 4 : 1 the fan and its driving mechanism is considerably less liable to failure than the comparatively delicate supercharger; for this reason the Major Series Jaguar and Lynx, though in a measure supercharged, are quite suitable for use in commercial aircraft, as the engine may be run at full throttle at ground level without risk of damage. Provision is made in these engines for fitting a hand-turning gear or inertia starter.

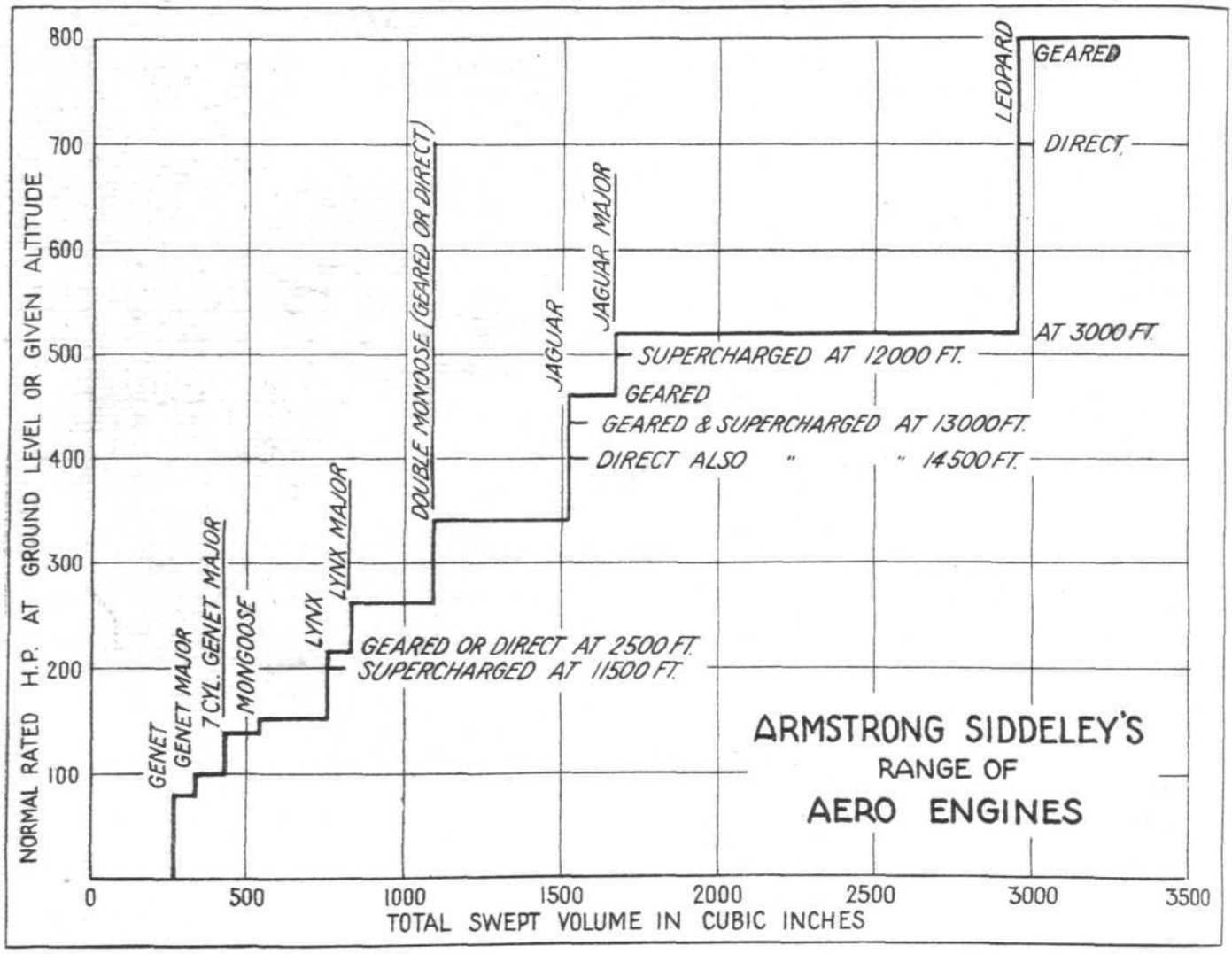
The 7-cylinder Genet Major is similar to the 5-cylinder model excepting the modified



The Armstrong-Siddeley "Double Mongoose" is the 10-cyl. version of the single-row "Mongoose."



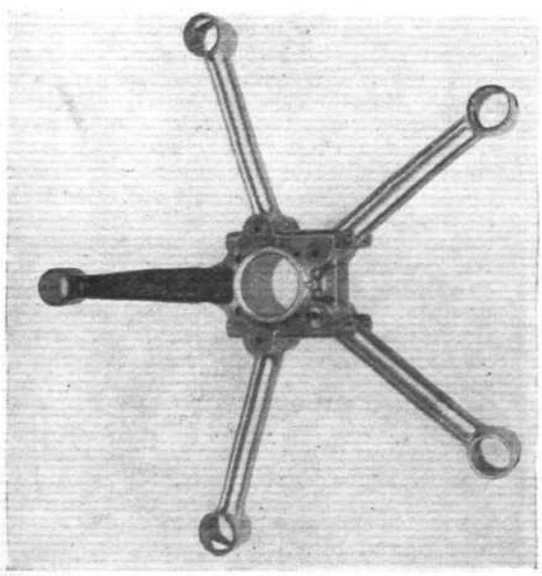
Rear view of the "Double Mongoose"; Note the grouping of accessories on the back of the engine.



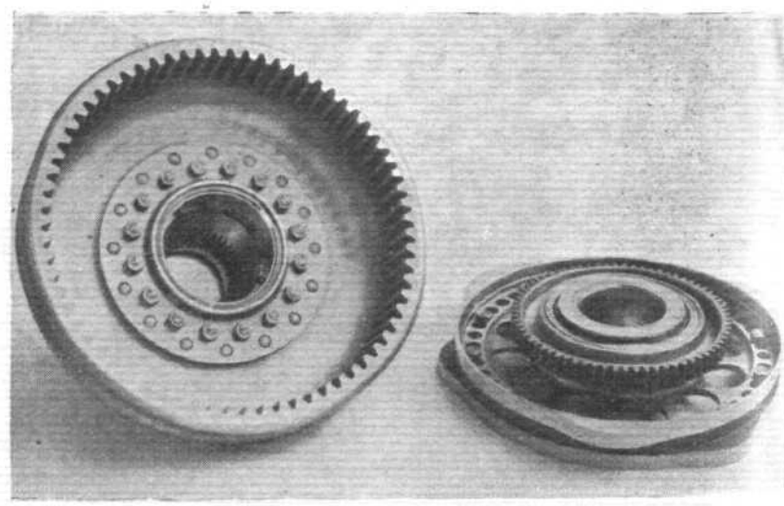
crankcase, timing gear, carburettor, and distribution arrangement resulting from the two extra cylinders. The power increase is directly proportional to the increased number of cylinders, as the crankshaft speed has remained unaltered, but there is, of course, a marked improvement in the weight/power ratio, as the increased weight is roughly of the order of 7/6 instead of 7/5.

Perhaps the most interesting of the new engines is the Double Mongoose. It may be remembered that the Lynx was evolved from the 14-cylinder Jaguar, the father of the present range of engines, by a process of division, or halving, and that later, by a little subtraction, the Mongoose was produced, this being the smallest of the engines in which Jaguar cylinders were employed. Now the Mongoose has been multiplied by two, resulting in an interesting 10-cylinder double-row radial engine of about 340 h.p. It thus enters the medium-power class, between the Jaguar and Lynx, and will, therefore, doubtless be in demand by the makers of the smaller cabin type passenger aircraft. This engine is available with either a geared or direct-driven airscrew shaft and, as the speed is higher than the original Mongoose, it gives more than double the output for considerably less than double the weight.

The well-tried and characteristic features of the earlier engines remain unaltered; the majority of these are so well known to FLIGHT readers that they need not be recapitulated.



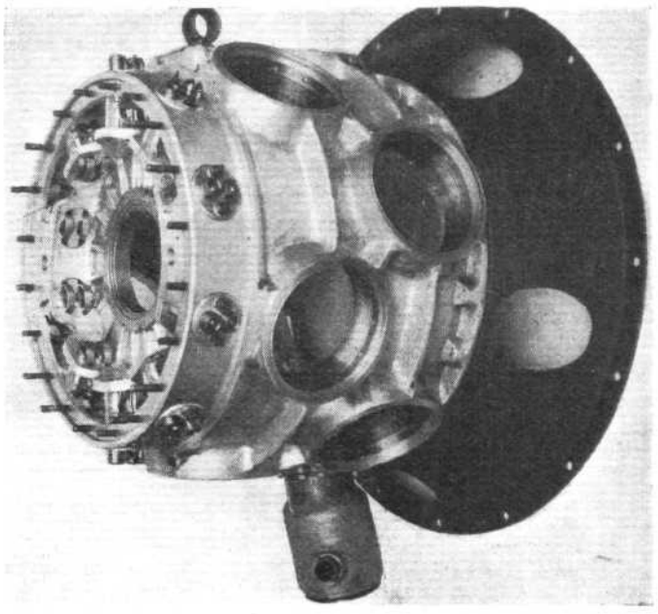
Connecting rod assembly of one of the banks of the "Double Mongoose."



Reduction gear and timing cam of "Double Mongoose."

Particulars	Type					
	Jaguar Major		Double Mongoose		Lynx Major	7-cyl. Genet Major
No. of cylinders ...	14		10		7	7
Bore	5·25		5·25		5·25	4·25
Stroke	5·5		5·5		5·5	4·5
Compression ratio ...	5 : 1		5 : 1		5 : 1	5·35 : 1
Normal r.p.m. ...	2,000		2,200		2,000	2,200
	Geared fan	Supercharged	Direct Geared			
Normal b.h.p. rated at sea level actual	—	—	—	—	—	140
Max. b.h.p. at sea level	507	465	342	342	260	—
Gear ratio	549	482	350	350	282	155
Rated normal b.h.p. at rated altitude	0·657		—	0·657	—	—
Max. b.h.p. at rated altitude	525 at 3,000 ft.	500 at 12,000 ft.	—	—	260 at 2,500 ft.	—
	575	550	—	—	28	—

A feature of interest is that Electron castings are now being employed for the timing gear housings in place of the alloy previously employed. This component has also been modified by casting integral with the housing the main oil filter chamber, which is now sunk into the housing instead of being attached externally thereto. A new type of Claudel-Hobson carburettor is also fitted, this type incorporating a power jet which comes into operation at full throttle to provide an enriched mixture for maximum power, the same jet being supplied by a pump during accelerating movements of the throttle. The three oil collecting compartments



Crankcase of the "Double Mongoose."

formed by the crankcase and the front and rear covers are separately drained by three scavenge pumps. A separate small pump supplies oil to the fan spindle bearings of those engines fitted with the geared fan. The above table gives full particulars of the new engines.

CROYDON WEEKLY NOTES

BAD weather has held up the transport services most of this week in the air as on the surface, and but for the distressing accident on Thursday it would have been quite uneventful. The cause of that deplorable happening is not yet clear. Four valuable lives have been lost and a popular and extremely experienced pilot crippled for life. We were told at a meeting of the Royal Aeronautical Society very recently that the problem of landing on an aerodrome in fog was being very successfully tackled. Can all the brains there indicate how a beginning could be made to solve the problem of a forced landing under the same conditions? The passengers on the machine were with one exception connected with the aircraft industry and should have been fully aware of the risk of flying on a twin-engined machine in such weather. It is satisfactory to know that they were warned beforehand by Imperial Airways' Paris staff. Yet they insisted on travelling.

The loss of Mr. Mason will be very severely felt at Croydon. His civil flying experience dates back to 1919 when he was the first flying mechanic of Handley Page Air Transport, Ltd. His service since then has been continuous and when Imperial Airways started their private Charter Section two years ago he was given the responsibility of its mechanical side. Mason was very popular and was trusted implicitly by all. In his enthusiasm for his work he learned to fly as a private pupil of the late Col. Henderson and took his pilot's "A" licence. In the opinion of those most likely to know, he had the makings of a very capable pilot, but unfortunately medical judgment was against him and he was unable to develop his "flare" for handling a machine. Mason had probably more flying hours to his credit than any civil pilot at Croydon.

The recovery of "Paddy" Flynn is eagerly hoped for by us all, and we hope, too, that his infectious good humour will have survived his disability.

Capt. R. P. Waters, who left us recently to start the Surrey Aero Club, is literally working day and night at Gatwick Aerodrome. During this bad weather he has had so many pupils waiting to pass their "A" licence tests that like the Old Lady of Shoe fame, he doesn't know what to do. The club has now 38 members, and a club-house situated in a romantic old building which dates back to the thirteenth century. The bar is said to be 77 ft. long. If each member brings one friend it sounds like a bar loading of one person per foot run, almost!

About mid-December, Capt. Waters intends setting out from Southampton with Miss Delphine Reynolds to investigate the possibilities of aviation in our West African dependencies. They will undertake the trip in a Gipsy-engined Blackburn Bluebird, fitted with floats. This machine, which will be presented to Miss Reynolds by her father, Sir James Reynolds, Bart., M.P., is capable of a speed of 100 m.p.h.

The Bellanca machine "Columbia" left Croydon on Friday for Berlin, with Capt. Errol Boyd and Lieut. Connor at the controls. The cheap press has built up a wonderful "story" out of the two charming passengers they carried in the cabin behind. But really the only astonishing thing about the affair was the nervousness of Capt. Boyd. After braving the Atlantic he was visibly disturbed at the thought of his wife seeing "movies" of the event and associating him with his passengers.

Four hundred and eighty passengers and 49 tons of freight were handled at Croydon Air Port last week. M. L.

The Schneider Trophy Position

MEMBERS of the Royal Aero Club Racing Committee are to go to Paris to attend a meeting of the Féderation Aeronautique Internationale, on November 30, to consider the final decision as to whether the race is to be held under the conditions drawn up and published last January, in accordance with the rules of the contest, or under the amended conditions agreed to by a full meeting of the F.A.I. last June. Great Britain holds that the former are binding, while Italy and France maintain that they have been legally superseded by the latter.

"Testing Aeroplane Controls"

ON Thursday, November 13, Mr. H. L. Stevens will lecture on the above subject before the Royal Aeronautical Society in the Lecture Hall of the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m. The lecture "Testing Aeroplane Controls" will not only deal with the methods of testing controls at Martlesham Heath, but will suggest what are the lines of development for improving control. To quote Mr. Stevens' words:—"In such a controversial subject, I can hardly expect that my opinions will be generally concurred in, but I hope they will result in others with more experience coming forward to join in the discussion."

British Flying Display at Athens

DURING the visit to Greece of the British Fleet, aircraft attached to the latter gave a flying display over Phaleron on October 19.

THE LONG-RANGE "AVIAN"

Gipsy II Engine

(*Concluded from p.* 1187)

LAST week we published a detailed description of the special features incorporated in the long-range "Avian" used by Wing-Commander Kingsford Smith on his record-breaking flight to Australia in 10 days. Below we are able to give, by the courtesy of A. V. Roe and Co., details of the calculations and estimates made before the flight was started. In almost every instance the actual figures achieved by the machine were better than the calculated. For example, when the machine was loaded to a gross weight of 2,225 lb., the take-off run on various tests was from 350 yards to 380 yards. The cruising speed at 1,900 r.p.m. varied from 92 m.p.h. at full load to 96 m.p.h. when all the fuel had been consumed

The tables and curves which follow were all based upon the machine as fitted with the De Havilland "Gipsy II" engine.

Summary of Performance Calculations at Ground Level

1. *At* 2,150 *lb.*

Top speed	113·5 m.p.h.
Max. R. of C.	503 ft./min. at 73 m.p.h.
Absolute ceiling	13,000 ft.
Service ceiling	10,400 ft.
Miles per gallon—	
At 90 m.p.h.	15·52.
At 95 m.p.h.	15·25.
At 100 m.p.h.	14·85.

2. *At* 1,800 *lb.*

Top speed	114·7 m.p.h.
Max. R. of C.	710 ft./min. at 71 m.p.h.
Absolute ceiling	16,400 ft.
Service ceiling	14,100 ft.
Miles per gallon—	
At 90 m.p.h.	16·45.
At 95 m.p.h.	16·0.
At 100 m.p.h.	15·47.

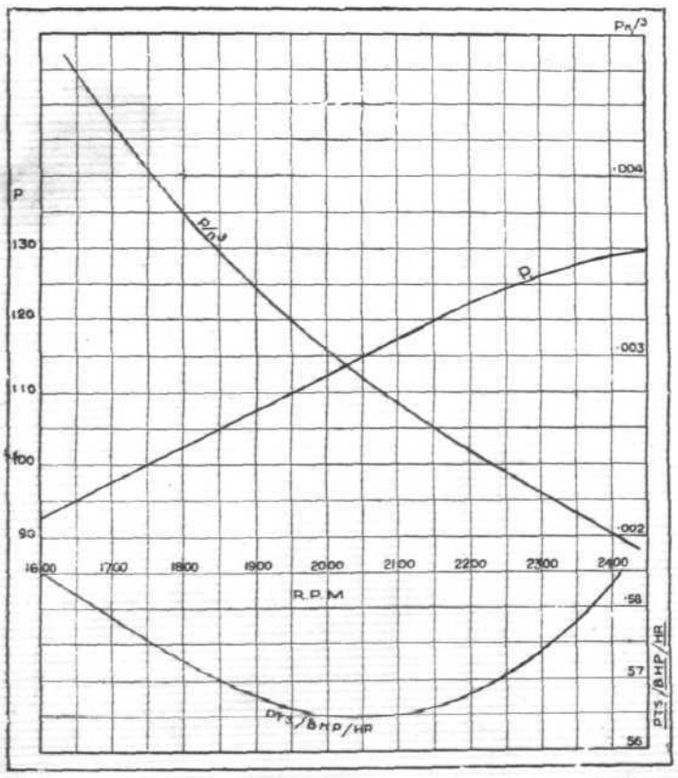


FIG. 1: POWER CURVE OF THE DE HAVILLAND "GIPSY II" ENGINE: Normal power 112·5 b.h.p. at 2,000 r.p.m. Maximum power 122·5 at 2,200 r.p.m. Note that the power curve does not flatten out until a speed of 2,450 r.p.m. is reached.

3. *At* 1,450 *lb.*

Top speed	116·2 m.p.h.
Max. R. of C.	983 ft./min. at 69 m.p.h.
Absolute ceiling	20,400 ft.
Service ceiling	18,300 ft.
Miles per gallon—	
At 90 m.p.h.	17·2.
At 95 m.p.h.	16·65.
At 100 m.p.h.	15·95.
Range with 115 galls. fuel in still air—	
At 90 m.p.h.	1,857 miles.
At 95 m.p.h.	1,810 ,,
At 100 m.p.h.	1,756 ,,
At 1,900 r.p.m.	1,842 ,,

Airscrew Characteristics

(By Method of Report No. A.D. 1444/C).

Airscrew diameter 6 ft. 2 in. $A = 10·9$

,, pitch .. 5 ft.

$P/D = 0·81$ $\frac{Pe}{D} = 1·01$

$Pe = 6·22$ ft.

$V = 117$ m.p.h. $N = 2,300$

$\frac{V}{nPe} = 0·719$ $E = 7·12$

$A = 1·48$ $B = 0·143$ $C = 0·36$ $A - BC = 1·428$

$$\text{Slip factor} = 1 - \frac{3 \times h \cdot K_B \times Sw}{D^2}$$

h = Amount of body drag in slipstream.

$$= 1 - \frac{3 \times \frac{2}{3} \times 0·0090 \times 243}{\left(\frac{76}{12}\right)^2}$$

$$= 1 - 0·127$$

$$= 0·873$$

$$\eta_i = 1·245 \times J_1 \frac{Kt\,Tc}{Kq\,Qc}$$

J ..	.. 0·4	0·5	0·6	0·65	0·719	0·75
F ..	..−0·0065	0	0·0107	0·178	0·0307	0·0374
K_qQ_c ..	.. 1·046	1·0	0·9237	0·873	0·7813	0·7335
P/n^2 ..	.. 0·003	0·00287	0·00265	0·0025	0·00224	0·0021
P ..	.. 113·0	115·1	118·7	121·8	126·1	128·0
N ..	.. 2,013	2,055	2,132	2,192	2,300	2,363
V,m.p.h.	.. 57·0	72·7	90·5	100·9	117·0	125·5
$J \cdot K_t/T_c$	.. 0·4532	0·5	0·5064	0·492	0·451	0·425
Nett η..	.. 0·54	0·624	0·683	0·702	0·719	0·722
T.H.P.	.. 61·0	71·8	81·0	85·6	90·7	92·3

Power Required at 2,150 lb. Gross Weight

$K_{D_i} = 0·1615$ K_L^2 $K_B = 0·009$

V m.p.h.	K_L	K_{D_p}	K_{D_i}	K_D	K_R	Drag, lb.	$\frac{DV}{375}$
120	0·1114	0·00598	0·00201	0·00799	0·01699	328	105
110	0·1325	0·00582	0·00284	0·00866	0·01766	287	84
100	0·1605	0·00566	0·00416	0·00982	0·01882	252	67·2
90	0·1980	0·00542	0·00634	0·01176	0·02076	225	54·0
80	0·2505	0·00522	0·01012	0·01534	0·02434	209	44·6
70	0·327	0·00505	0·01728	0·02233	0·03133	206	38·4
60	0·444	0·00530.	0·03185	0·03715	0·04615	224	35·7
52·6	0·58	0·0180	0·0544	0·0724	0·0814	203	42·3

Top speed .. .. 113·5 m.p.h.

Thrust power for climb .. .. .. 32·7

R. of C. .. .. $\frac{32·7 \times 33,000}{2,150} = 503$ f.p.m.

Absolute ceiling .. .. 13,000 ft.

Service ceiling .. .. 10,400 ,,

Airscrew Characteristics at Constant R.P.M.

N = 2,160 r.p.m. n^3 = 46,656
P = Full throttle = 120·3

J	0·65	0·70	0·75
K_qQ_c	0·873	0·809	0·7385
P/n^3	0·0025	0·00232	0·0021
P	116·6	108·3	98·0
V	99·25	106·9	114·5
η_i	0·702	0·716	0·722
T.H.P.	81·9	77·5	70·8

N = 2,100 r.p.m. n^3 = 42,875.
P, Full Throttle = 117·4.

J	0·65	0·7	0·75
P/n^3	0·0025	0·00232	0·0021
P	107·1	99·5	90·0
V	96·5	103·9	111·3
η_i	0·702	0·716	0·722
T.H.P.	75·2	71·3	65·0

N = 2,040 r.p.m. n^3 = 39,304.
P, Full Throttle = 114·4.

J	0·65	0·7	0·75
P	98·3	91·2	82·5
V	93·8	101·0	108·1
T.H.P.	69·1	65·3	59·5

N = 1,980 r.p.m. n^3 = 35,937 P = 111·5

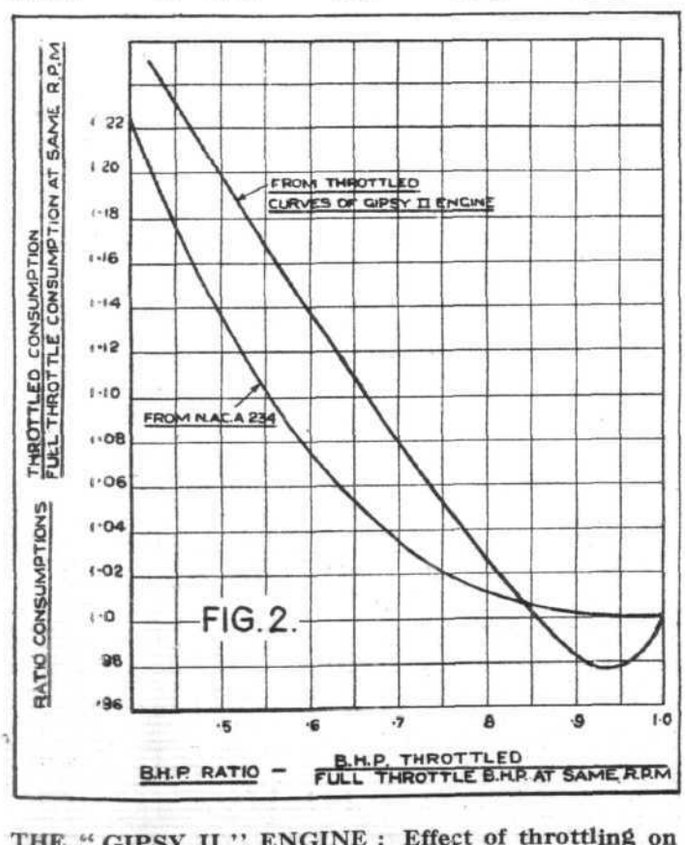
J	0·65	0·7	0·75
P	89·8	83·4	75·5
V	91·0	98·0	105·0
T.H.P.	63·0	59·6	54·5

N = 1,920 r.p.m. n^3 = 32,768 P = 108·5

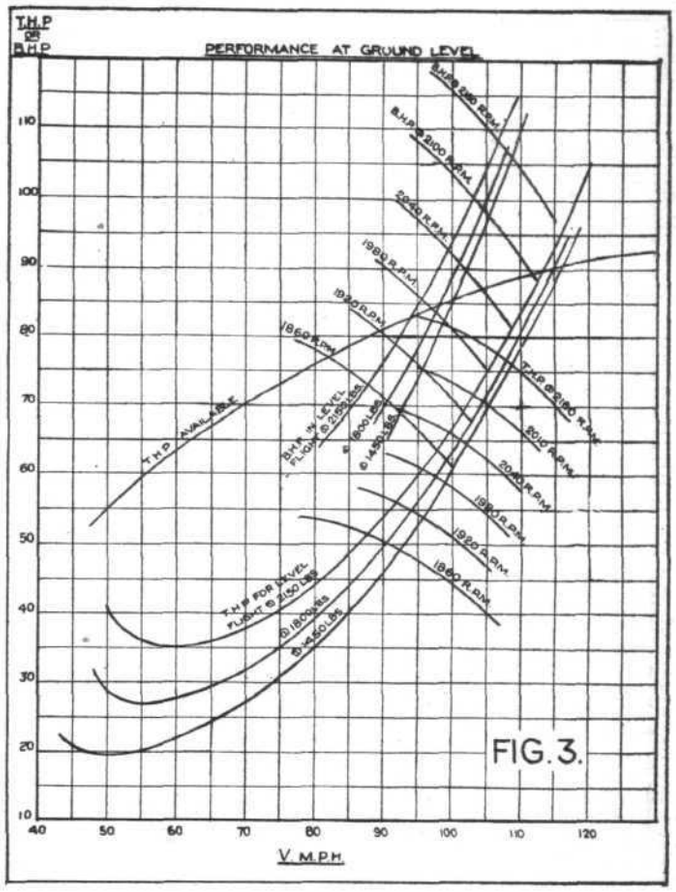
J	0·65	0·7	0·75
P	81·9	76·0	68·8
V	88·3	95·0	101·8
T.H.P.	57·5	54·4	49·7

N = 1,860 r.p.m. n^3 = 29,791 P = 105·5

J	0·65	0·7	0·75	0·6
P	74·5	69·1	62·6	78·0
V	85·5	92·1	98·7	78·9
T.H.P.	52·3	49·5	45·2	53·3



THE "GIPSY II" ENGINE: Effect of throttling on basic consumption. The relative consumption curve for the "Gipsy" engine has been used in this estimate. This curve is less optimistic at cruising than the standardised curve given in N.A.C.A. 284.



THE LONG-RANGE AVIAN: Power-required and power-available curves, ground level conditions.

Throttled Consumption of "Gipsy II" Engine

R.P.M.	B.H.P. Maximum	B.H.P. Throttled	Throttled B.H.P. / Maximum B.H.P.	Consumption pts./B.H.P./Hr. Maximum	Consumption pts./B.H.P./Hr. Throttled	Throttled Consumption / Maximum Consumption
1,200	—	23·3	—	—	0·897	—
1,300	—	30	—	—	0·825	—
1,400	—	37·1	—	—	0·765	—
1,500	—	45	—	—	0·713	—
1,600	92·5	53·6	0·579	0·585	0·673	1·15
1,700	97·7	63·3	0·649	0·579	0·642	1·11
1,800	102·8	74·2	0·722	0·573	0·612	1·068
1,900	107·8	85·3	0·792	0·568	0·586	1·032
2,000	112·6	97·3	0·865	0·565	0·563	0·997
2,100	117·5	109·3	0·93	0·565	0·552	0·977
2,200	122·2	122·2	1·0	0·568	0·568	1·0
2,300	126·2	—	—	0·572	—	—
2,400	129		—	0·583	—	—

Consumption in Level Flight.

At 2,150 lb. Gross Weight.

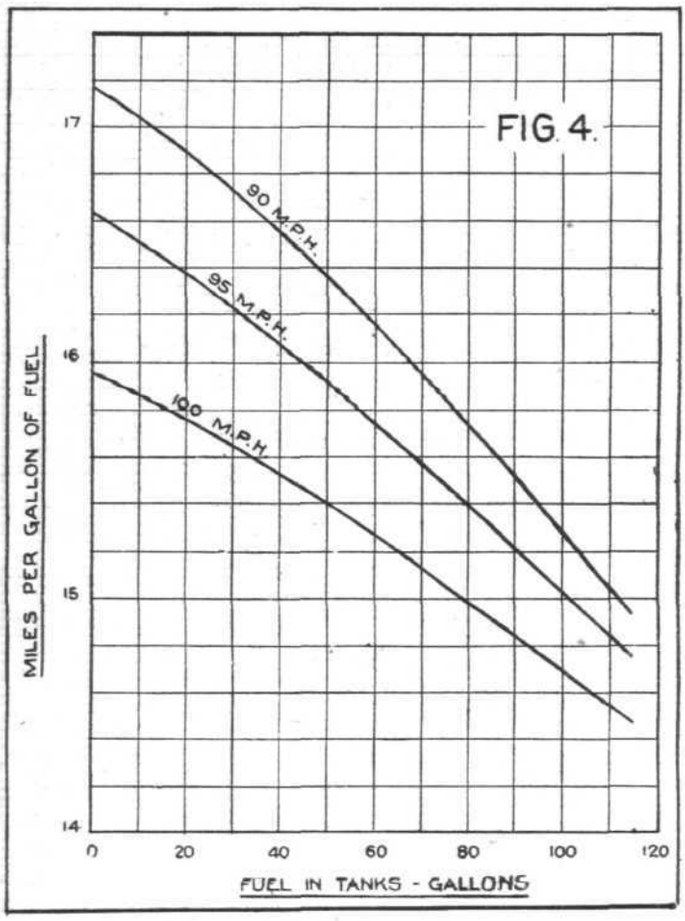
R.P.M.	1,860.	1,920.	1,980.	2,040	2,100.	2,160.
B.H.P. (maximum)	105·5	108·5	111·5	114·4	117·4	120·3
V. m.p.h.	87·8	91·9	95·7	99·6	103·1	106·7
B.H.P. (throttled)	73	79·0	85·6	92·7	100·2	108·4
B.H.P. (ratio)	0·692	0·728	0·768	0·809	0·853	0·901
Full T. consumption (g./B.H.P./hr.)	0·5697	0·5672	0·5654	0·5647	0·5651	0·5664
T. consumption (gals./hr.)	5·64	5·96	6·21	6·70	7·10	7·55
M.p.g.	15·6	15·4	15·4	14·9	14·5	14 1

At 1,850 lb. Gross Weight.

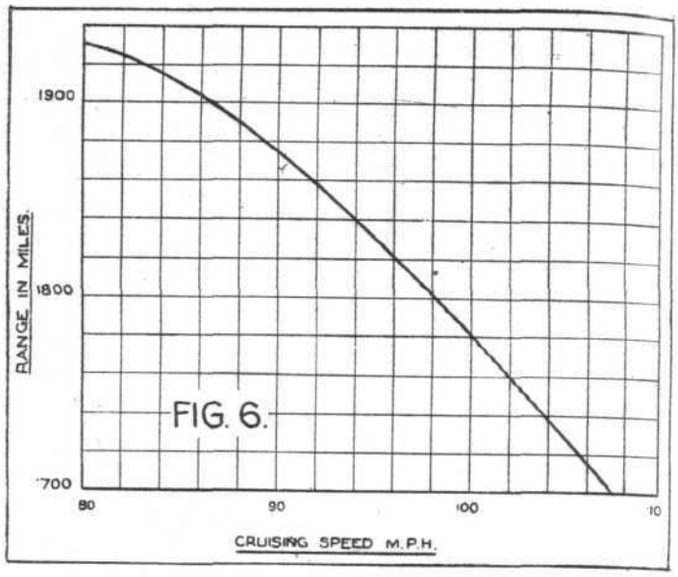
R.P.M.	1,860	1,920	1,980	2,040	2,100	2,160
V	90·7	94·3	97·7	101·2	104·6	108·0
B.H.P.	70·6	76·8	83·7	91·0	98·7	106·9
B.H.P. ratio	0·669	0·707	0·751	0·795	0·840	0·889
Galls., cons.	5·53	5·86	6·23	6·62	7·04	7·46
M.p.g.	16·4	16·1	15·7	15·3	14·9	14·5

At 1,450 lb. Gross Weight.

V	92·6	95·8	99·0	102·2	105·4	108·1
B.H.P.	68·8	75·2	82·3	89·8	97·8	106·3
B.H.P. ratio	0·652	0·693	0·738	0·784	0·833	0·883
Galls, cons.	5·54	5·78	6·16	6·57	7·0	7·45
M.p.g.	16·7	16·6	16·1	15·6	15·1	14·5



THE LONG-RANGE AVIAN : Miles per gallon of fuel used.



CRUISING RANGE OF LONG-RANGE AVIAN : Fuel capacity 115 gallons.

Cruising Range and Duration at 1,900 r.p.m.

Since the foregoing estimate was made, it was decided to cruise at 1,900 r.p.m. for the whole journey.

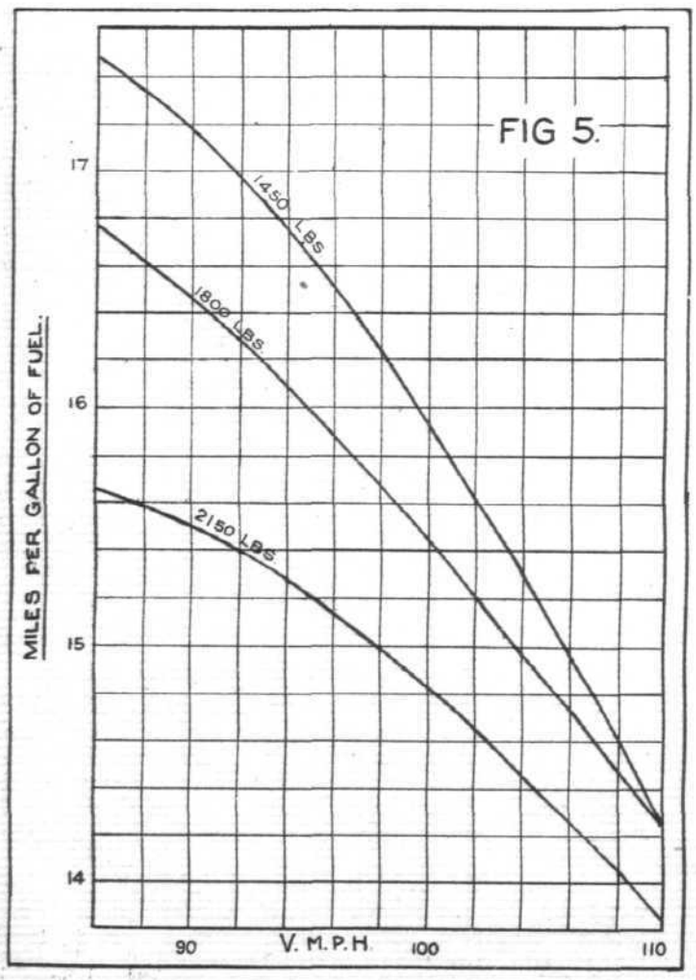
From the previous estimate, the speeds corresponding to 1,900 r.p.m. are as follows :—

Gross weight. lb.	Speed. m.p.h.
1,450	94·8
1,800	93·1
2,150	90·6

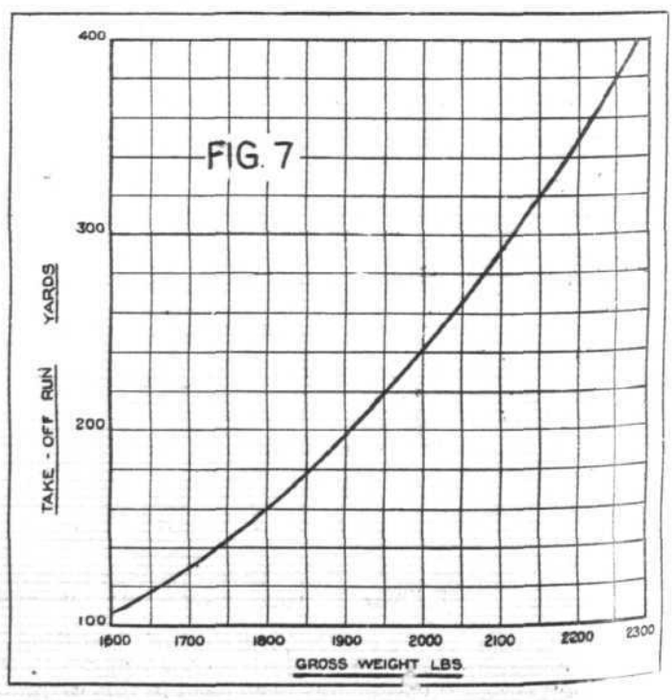
The total range is 1,842 miles on 115 gallons of fuel.

Duration, 19·84 hr.

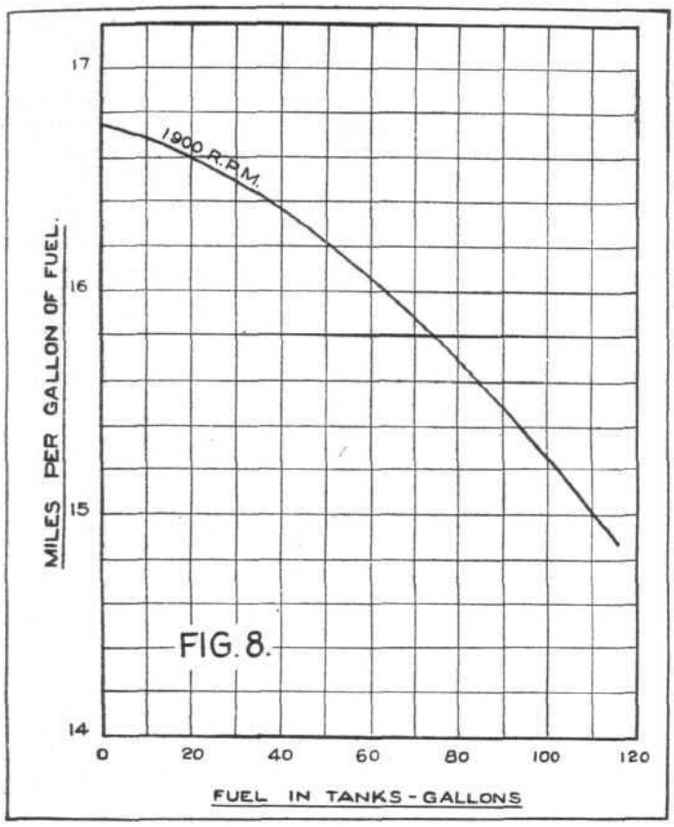
Total oil used at 1 pint per hour is $2\frac{1}{2}$ gallons, leaving 1 gallon in the engine at the end of the journey.



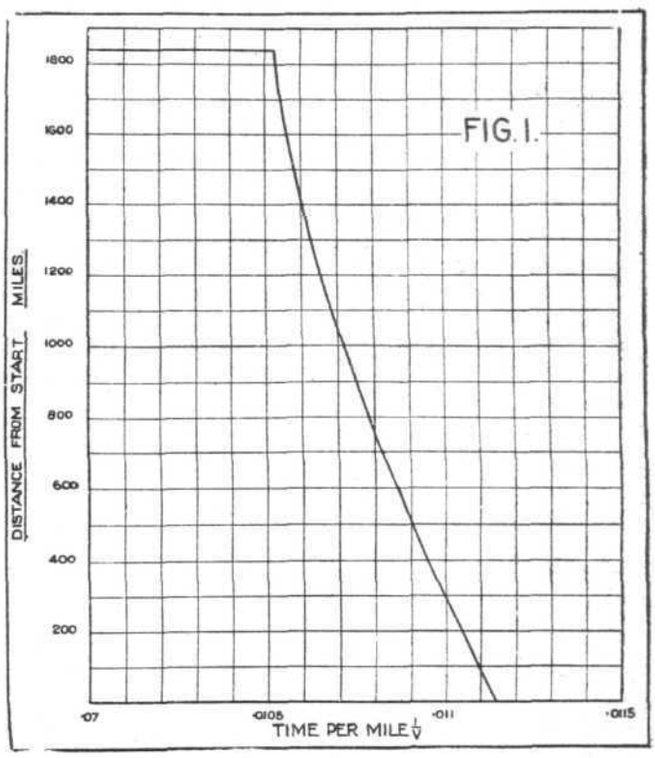
THE LONG-RANGE AVIAN : Miles per gallon of fuel at three gross weights.



THE LONG-RANGE AVIAN : Take-off run at various gross weights.



THE LONG-RANGE AVIAN: Miles per gallon of fuel used at 1,900 r.p.m.



THE LONG-RANGE AVIAN: Determination of Duration.

Cruising Consumption at 1,900 r.p.m.

The cruising consumption is obtained as follows :—

Gross weight, lb.	2,150	1,800	1,450
V, m.p.h.	90·6	93·1	94·8
B.H.P.	76·9	74·6	73·0
B.H.P./full throttle B.H.P. = B.H.P./107·5	0·715	0·695	0·679
Relative basic consumption ..	1·072	1·084	1·092
Basic consumption pts./B.H.P./hr.	0·61	0·616	0·621
Consumption, galls./hr.	5·86	5·70	5·66
Miles per gallon	15·5	16·3	16·75

Range at 1,900 r.p.m.

Fuel used, Gall.	Weight of fuel in Tanks, lb.	Range in Miles	Gross Weight, lb.
10	801	150	2,171
20	724	303	2,093
30	648	458	2,015
40	572	615	1,937
50	496	774	1,858
60	420	934	1,780
70	343	1,097	1,701
80	267	1,260	1,623
90	191	1,425	1,545
100	114	1,591	1,465
110	38	1,758	1,387
115	0	1,842	1,348

Determination of Duration

Distance from Start, miles	$\frac{1}{V}$	Time over interval	Hours flown from start
200	0·01109	—	2·218
400	0·010995	2·199	4·417
600	0·01091	2·182	6·599
800	0·01082	2·164	8·763
1,000	0·01075	2·150	10·913
1,200	0·010685	2·137	13·050
1,400	0·01063	2·126	15·176
1,600	0·01058	2·116	17·292
1,800	0·010545	2·109	19·401
1,842	0·01053	0·442	19·843

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

MEMBERS of the S.M.A.E., and affiliated clubs, gathered in force at the Y.M.C.A., Tottenham Court Road, on Thursday, October 30, to discuss the all-important question of "How to Get Back the Wakefield Cup from America." The Chairman, Dr. A. P. Thurston, called upon Mr. R. N. Bullock, technical secretary of the S.M.A.E., to give those present some idea of the type of model which he thought would be most likely to bring the Cup back to England, with the aid of a model belonging to Dr. A. P. Thurston, and made by Mr. Joe Culver, a well-known American aeromodellist.

Mr. Bullock pointed out the various differences between the English and American types in general use, and urged the use by constructors in England of larger and slower-speed propellers, a lighter loading per square foot, and more attention to the winding of rubber motors than is the general practice at present. Mr. J. E. Pelly-Fry, who had been testing the flying capabilities of Mr. Culver's model for Dr. Thurston, pointed out that though this model had flown for 14½ minutes in America, the motive power ran out in about 90 seconds; therefore, it seemed that Mr. Culver's model was more or less of a "power glider." It was considerably overpowered, and it seemed that the main idea was to get the model to climb to a great height at the beginning of its flight and then, by its extreme lightness of loading, to float about in the exceptional air conditions that seemed to prevail in America, for the rest of the duration of flight.

The meeting was then thrown open for questions, and a lively discussion followed on the merits and demerits of "high" or "low" wing models, "lifting" or "non-lifting" tail planes, and various other problems with which constructors are faced. This terminated a very interesting and instructive evening to all present.

The next meeting will be held at the Y.M.C.A., Tottenham Court Road, on Thursday, November 13, when Mr. E. H. Brindley, of the Balsa Wood Co., will lecture on "Balsa Wood." All members of the S.M.A.E., and affiliated clubs, and anyone interested ,will be cordially welcomed. S. G. Mullins, Hon. Sec., S.M.A.E., 72, Westminster Avenue, Thornton Heath, Surrey.

THE RETURN OF COSTES AND BELLONTE

AS briefly reported last week, Costes and Bellonte arrived back in Paris on October 25, and below we describe the official welcome accorded them.

Punctually, almost to the minute, as during practically all their recent tour of the United States, Costes and Bellonte arrived at the le Bourget Airport last Saturday at 12.30 o'clock. The sun was just breaking through the clouds, after numerous showers, that morning as the red "Question Mark" of the transatlantic airmen appeared in the West, escorted by a squadron comprising about a dozen pursuit planes of the 34th Aviation Regiment. After circling around the field several times, Costes made a perfect landing in front of the cemented embarkation area of the airport and taxied up to the centre of the square where a distinguished assemblage was waiting to greet him.

The 34th Aviation Regiment had been drawn up in a hollow square, of three sides, on the embarkation area in front of the official buildings of the airport, and the "Color Guard" of the American Legion stationed in front displayed the United States and the Legion colours. In the centre, between the military lines, numerous high civilian and military officials awaited the arrival of the transatlantic aviators. Sir Laurent Eynac, the Air Minister, surrounded by his staff, was the central figure. General Gouraud, the Military Governor of Paris, Monsieur Ricolfi, the Assistant Minister of War, General Barres, the Inspector General of the French Air Force, Wing Commander Bone, Air Attaché of the British Embassy in Paris, Captain George W. Steele, U.S. Naval Attaché, Major R. L. Walsh, U.S. Air Attaché, General Piccio, the Italian Air Attaché and many prominent civilians were also present.

After disembarking from their plane and being greeted by the Air Minister, General Gouraud and others of their friends, Costes and Bellonte left immediately for Paris in an automobile, accompanied by Mr. Laurent Eynac. They laid a wreath on the tomb of the unknown soldier under the Arc de Triomphe on the Champs Elysées and were then received at 2 o'clock by Mr. Gaston Doumergue, the President of the French Republic at the Presidential Mansion, just off the Champs Elysées. Mr. Doumergue bestowed on Costes the insignia of a Commander of the Legion of Honour and on Bellonte that of an Officer of that order. A reception at the City Hall, given by the Paris Municipal Council, followed at 3 o'clock. Then after a short visit to the U.S. Embassy, where they were received by Mr. Norman Armour, the Charge d'Affaires in the absence of Ambassador Edge, Costes and Bellonte repaired to the Aero Club of France, where another large and enthusiastic assemblage awaited them. This reception was held in the new building of the club, which has a salle de fetes, capable of seating about 800 persons. Mr. Laurent Eynac, the Air Minister presided and the hall was packed to the doors, many people standing outside on the street. A stage had been erected at the end of the room, on which were assembled a distinguished group of civil and military officials of various nationalities in addition to those of France. This reception ended the day's proceedings and Costes and Bellonte left to pass a quiet Sunday in their respective homes.

Capt. Costes (left) driving through Paris, accompanied by Sir Laurent Eynac.

A detailed description of the *Question Mark* was published in the September 12th number of FLIGHT.

In addition to the Transatlantic flight, Costes and Bellonte also carried out a "Good-will" tour of America in the Breguet *Question Mark*—which is now three years old and in which Costes has established a number of records — and the following table showing the distances and times may be of interest:

Paris-New York		6,700 km.	(37 hr. approx.)
New York-Dallas and return		4,525 ,,	
New York-Washington and return		325 ,,	

The good-will tour comprised:—

Date.		km.
15 Sept.	New York-Hartford-Boston	330 (2 h. 16 m.).
16 ,,	Boston-Syracuse-Rochester-Cleveland	1,000 (6 h. 42 m.).
17 ,,	Cleveland-Indianapolis-Detroit	950 (5 h. 27 m.).
18 ,,	Detroit-Chicago	400 (3 h. 30 m.).
19 ,,	Chicago-Milwaukee-Saint Paul	620 (3 h. 55 m.).
22 ,,	Saint Paul-Omaha-Denver	1,606 (9 h. 18 m.).
23 ,,	Denver and return (on account bad weather)	370 (2 h. 30 m.).
24 ,,	Denver-Salt Lake City	630 (5 h.).
25 ,,	Salt Lake City-Boise-Pasco	900 (5 h. 17 m.).
26 ,,	Pasco-Portland-San Francisco	1,260 (7 h. 1 m.).
27 ,,	San Francisco-Los Angeles	550 (3 h. 10 m.).
29 ,,	Los Angeles-Phoenix-El Paso	1,050 (6 h. 34 m.).
30 ,,	El Paso-San Antonio	810 (5 h. 30 m.).
1 Oct.	San Antonio-Oklahoma-Kansas City	1,160 (6 h. 45 m.).
2 ,,	Kansas City-Saint Louis	380 (2 h. 55 m.).
3 ,,	Saint Louis-Memphis-New Orleans	970 (6 h. 58 m.).
6 ,,	New Orleans-Pensacola-Atlanta	750 (5 h. 20 m.).
7 ,,	Atlanta-Winston-Salem	450 (3 h. 30 m.).
8 ,,	Winston Salem-Richmond	360 (2 h. 18 m.).
9 ,,	Richmond-Baltimore	210 (1 h. 28 m.).
10 ,,	Baltimore-Philadelphia-New York	275 (1 h. 50 m.).
		km. 26,220 (16,387·5 miles)

"Punch" Almanack, 1931

IN the 1931 Almanack will be found, besides many old acquaintances in the central double-page colour design by Reynolds depicting Mr. Punch entertaining his Artists' models, a large preponderance of illustrations. Other colour illustrations which will attract attention are George Morrow's "Little Ancient Britons who Discovered where Father Kept the Woad," and a series of nine pictures by Ghilchik, "One Course One Frock," showing a lady donning a new dress to harmonise with each course and achieving a staggering effect for the savoury. Particularly amusing is a series of pictures by J. H. Dowd, called "Genii Who Would Shine in any Sphere," including "Mr. Maxton as a Company Promotor," "Miss Amy Johnson as a Nurse-maid," "Sir Thomas Beecham as a Charabanc-Conductor," "Mr. G. B. Shaw as a Street-vendor (with apple cart)," and some six or eight other celebrities in novel and entertaining rôles. The literary portion includes a clever and entertaining extravaganza by "Evoe" about the "Royal and Awful Golf Course of Gamboogia," and a delightful sketchy Musical Comedy in three thrilling acts, "The Girl in the Clock Tower," by A. P. H. The price remains as before at 1*s*.

Fleet Air Arm Badges

THE Admiralty have decided to introduce distinguishing badges for telegraphist air gunners in the Fleet Air Arm. These will take the form of an aeroplane in gold, red, or blue for different ratings.

THE ROYAL AERO CLUB OF THE UNITED KINGDOM

OFFICIAL NOTICES TO MEMBERS

REPORT of the meeting of the Royal Aero Club Associated Light Aeroplane Clubs' General Council, held at 3, Clifford Street, London, W.1, on Thursday, October 23, 1930, at 2.30 p.m.

Present :—Col. Sir Joseph Reed (Newcastle-on-Tyne Aero Club) in the Chair ; Bristol and Wessex Aeroplane Club (A. H. Downes-Shaw, Capt. L. P. Winters, and R. Ashley Hall) ; Hampshire Aeroplane Club (H. J. Harrington and Graham Gibbs) ; Hanworth Park (G. E. F. Boyes) ; Lancashire Aero Club (Major A. R. Goodfellow and J. C. Cantrill) ; London Aeroplane Club (Major K. M. Beaumont and H. E. Perrin) ; Midland Aero Club (Major G. Dennison) ; Newcastle-upon-Tyne Aero Club (B. M. Dodds) ; Northamptonshire Aero Club (G. Linnell) ; Royal Aircraft Establishment Aero Club (P. N. G. Peters) ; Royal Aero Club (Lieut.-Col. M. O. Darby and Lieut.-Col. M. O'Gorman). In attendance : H. E. Perrin, Secretary ; B. Stevenson, Assistant Secretary.

Minutes.—Minutes of meeting of the General Council, held on August 14, 1930, were read and signed.

R 101.—The Chairman referred to the recent disaster to R 101, and the following resolution was unanimously passed and instructed to be forwarded to the Air Council :—

> "That the General Council of Associated Light Aeroplane Clubs, at their meeting on Thursday, October 23, 1930, desire to express their deep sense of the irreplaceable loss sustained in the disaster to Airship R 101 whereby, amongst other friends of the clubs, Lord Thomson, our late chairman, and Sir Sefton Brancker, who did so much to further the Light Aeroplane Club movement, lost their lives, and tender their profound sympathy to the Air Council."

Insurance.—The General Council considered the question of club insurance, and decided to draw up a standard cover for submission to the underwriters. It was also decided that the General Council should consider the matter of accidents and take steps to ensure that the circumstances of each accident were fully enquired into by the clubs concerned, so that the information as to the causes of accidents should be available to all clubs.

The following committee was appointed to deal with these two questions :—Col. Sir Joseph Reed, Chairman ; Major K. M. Beaumont, D.S.O., London Aeroplane Club ; G. E. F. Boyes, Hanworth Park Club ; Major G. Dennison, Midland Aero Club ; Major A. R. Goodfellow, Lancashire Aero Club ; E. J. Quarrington (Honorary Insurance Adviser to the General Council) ; H. E. Perrin (Secretary), Royal Aero Club.

Aviators' Certificates.—The following Aviators' Certificates have been granted :—

9495	Mohamed Zubay Abowl-Caffoor	Hanworth C. (N.F.S.).
9496	Stanley Joseph Murphy ..	Hanworth C. (N.F.S.).
9497	Eileen Lois Turner ..	Suffolk & E.Co. A.C.
9498	Peter Bathurst	Bristol and Wessex A.C.
9499	William A. Blackmore-Greenfield ..	Hanworth C. (N.F.S.).
9500	Grace Richardson	Nottingham A.C. (N.F.S.).
9501	Robert George Ellice ..	Hanworth C. (N.F.S.).
9502	Delphine Reynolds ..	Surrey A.C.
9503	Joan Marion Page ..	Hanworth C. (N.F.S.).
9504	Graham Stobart Hook ..	I.W. Fl.C.
9505	Jim Kempster	London A.C.
9506	Arthur Robert Frogley ..	London A.C.
9507	Ernest Wood	Marshall's Fl.S.
9508	Jean Lennox Bird ..	Hampshire A.C.
9509	Lennox Godfrey Bird ..	Hampshire A.C.
9510	Arthur Reid Pedder ..	Hampshire A.C.
9511	Anthony R. M. Geddes ..	Hampshire A.C.
9512	William Theobald Hindson	Hampshire A.C.
9513	Patrick H. R. Saunders ..	Airwork Fl.S.
9514	Dennis Edwin Walker ..	Norfolk and Norwich A.C.
9515	Cyril John Penny ..	Phillips and Powis Fl.S.
9516	Claude Cornwell	Cinque Ports Fl.C.
9517	Jack Irwin Harrison ..	London A.C.
9518	Richard Henry Ovey ..	Berks, Bucks and Oxon A.C. (N.F.S.).
9519	Richard Kershaw ..	Hanworth C. (N.F.S.).
9520	Douglas William Gumbley	Hanworth C. (N.F.S).
9521	George Paterson Ross ..	Scottish Fl.C.
9522	John McKean	Scottish Fl.C.
9523	Arthur Franklyn	Lancashire A.C.
9524	Henry James Young ..	Norfolk and Norwich A.C.
9525	Ethel Ruth Nicholson ..	London A.C.
9526	Leonard M. K. Williams	Cinque Ports Fl.C.
9527	Kenneth G. W. Lewis ..	London A.C.
9528	Eugene James Earle ..	De Havilland Fl.S.
9529	Bernard C. T. Elworthy ..	Brooklands Fl.S.
9530	Rachel E. J. Balfour ..	Hanworth C. (N.F.S.).
9531	Walter Harold Wilton ..	Hampshire A.C.
9532	Mouhamed Fauzi Hoss ..	Southern A.C.
9533	Frank Russell Perkins ..	Hampshire A.C.
9534	William Theodore Eshelby	London A.C.
9535	Tej Bahadur Shahi ..	Hanworth C. (N.F.S.).
9536	Denis Frank Satchwell ..	Phillips and Powis Fl.S.
9537	Henry Clarence Stringer	Norfolk and Norwich A.C.
9538	Robert Thomas Reynolds	Cinque Ports Fl.C.
9539	Frances Anne S. Henfrey	Norfolk and Norwich A.C.
9540	Inigo B. Freeman-Thomas	Southern A.C.
9541	Francis G. Watson-Smyth	Berks, Bucks and Oxon A.C. (N.F.S.)
9542	Lissant Beardmore ..	Phillips & Powis Fl.S.
9543	Earl of Cardigan	Hanworth C. (N.F.S.).
9544	John T. P. Jeyes	Northamptonshire A.C.
9545	Elizabeth Timmis	Bristol and Wessex A.C.
9546	Wilfred Ingham Briggs ..	Bristol and Wessex A.C.
9547	Eleanor Mary Olney ..	Northamptonshire A.C.
9548	Alfons Breitenbach ..	De Havilland Fl.S.
9549	Arthur Alfred Ficker ..	London A.C.
9550	George B. S. Errington ..	Lancashire A.C.

Offices : THE ROYAL AERO CLUB
3, CLIFFORD STREET, LONDON, W.1.
H. E. PERRIN, Secretary.

Howden and Cardington Staffs

A NUMBER (actually 139 men and 94 women) of the 750 employees at the Royal Airship Works, Cardington, have been given notices of dismissal, the notices affecting all grades from those engaged on administration and design downwards. The notices have been given with a view to keeping the airship organisation as efficient as possible on the basis of only one ship remaining at the Royal Airship Works. The employees had been insured against unemployment. The airship works at Howden, where R 100 was built by the Airship Guarantee Co., Ltd., are to be closed down at the end of November, and all the staff, from the chief designer downwards, have been given notice. Over 60 men are affected.

Honours for R 101 Survivors

H.M. THE KING has been pleased to award the Albert Medal to Mr. Henry James Leech, A.F.M., in recognition of his bravery after the crash of R 101. Mr. Leech, after escaping himself, re-entered the hull and rescued another member of the crew. His Majesty has also approved of the grant of the Medal of the Civil Division of the Order of the British Empire for Meritorious Services to Mr. Arthur Disley, who, though severely burned, telephoned the details of the crash to the Air Ministry before going to hospital for treatment.

Relatives of R 101 Victims

MR. MONTAGUE, Under-Secretary of State for Air, has stated in the House of Commons that the grant of pensions and gratuities to the dependents of the victims of R 101 was governed by King's Regulations in the case of R.A.F. personnel, and by the Home Secretary's Aircraft Order of 1924 in other cases. He gave an assurance that the regulations would not be interpreted in any narrow or grudging spirit.

PRIVATE FLYING AND CLUB NEWS

THE HAMPSHIRE Aeroplane Club are holding their annual dinner and dance at the South Western Hotel, Southampton, on December 12.

CINQUE PORTS FLYING CLUB.—Total flying time for week, 24 hr. 30 min.

On Friday, October 31, a Chinese member, Mr. Siang Tsi Sun was sent solo and put up a good show. This is a great triumph both for Mr. Sun and Mr. K. K. Brown, as the former's English is not at all fluent, and this has given rise to very great difficulties during his instruction and resulted in him taking a long time to learn.

AERO CLUB Operations in Australia.—In keeping with the various other branches of aviation, the Flying School movement is making rapid progress. The growth of operations, as conducted by the Australian Aero Club, Queensland Section, has been striking. In May, 1929, when the Aero Club took over operations, there were four pupil members and four pilot members on the books. At the present time there are 33 pupil members and 45 pilot members of the club, and seven pupils members on the waiting list.

From an average monthly total of approximately 30 hr. flown, operations have built up to an average well in excess of 150 hr. During one period of three weeks, 125 hr. 30 min, were flown. The cost of graduation for an "A" Pilot's licence has worked out at approximately £45. The average dual control instruction given before going solo works out at 7 hr. 35 min. the shortest time on record being 5 hr. 25 min., and the longest 15 hr. 15 min.

FLYING CLUB for Cardiff ?—Over 50 potential aviators in the Cardiff area attended a meeting at the Wharton Galleries, Morgan Arcade, on Friday night, October 24. Mr. J. E. Evans presided, and a committee of five was appointed to visit other flying clubs, to take up with the Ministry the question of a subsidy, and to report to a meeting to be held a fortnight hence, the result of their investigations.

HANWORTH CLUB'S RECORD.—A fine record has been made at the Hanworth Flying Club during the last three months, 51 members having been trained as pilots. Twenty-four qualified in August, 17 in September, and 10 in October.

Since the club opened on September 1 last year, its growth has been one of the features of the National Flying Services' scheme. The number of licensed pilot members of Hanworth is now 169, and the total membership of the club is 1,030, with 572 active flying members. On an average, 10 new members enrol every week.

The members have flown over 6,000 hr. during the past year. Flt.-Lt. Max Findlay, the Chief Instructor at Hanworth, has spent 800 hr. in the air since joining last November.

Pupils have come from practically every part of the world to learn to fly in London. The overseas members include 16 different nationalities, and among those taught to fly are Indians, Canadians, Australians, New Zealanders, French, Germans, Italians, Spaniards, Americans, Argentinos, Japanese and Egyptians. Thirty-four of the 169 "A" licences have been taken by these overseas members.

Hanworth was the first of the six flying clubs now operating under National Flying Services, Ltd. The total membership of these clubs has now grown to 1,707, and of these 975 are active flying members, 266 hold pilots' "A" licences, and 56 have their own aircraft.

PRIZE FLIGHTS for Theatre Lovers.—Efforts are being made to add 5,000 members to the existing 15,000 members of the scheme for a People's Theatre in London, in order to put the plan into full operation.

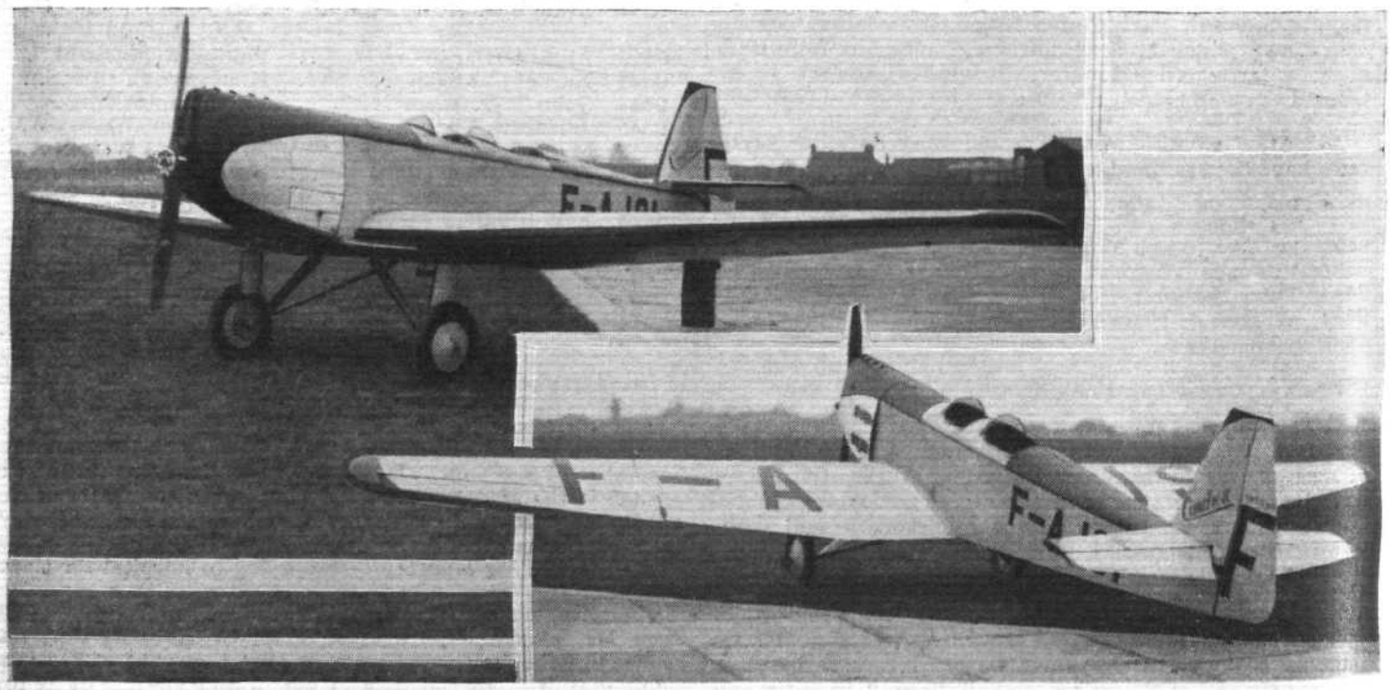
Sir Alan Cobham, one of the Founder Members, is arranging a most original offer of prizes to stimulate this final drive for membership. Every subscriber who enrols 100 or more members before November 20 will receive a flight under Sir Alan's supervision.

By the kindness of Imperial Airways, the Royal Dutch (K.L.M.) Air Lines, and National Flying Services, the flights will include a week-end return trip to Paris, a return trip to Rotterdam, a flight over London, a trial flying lesson, a flight over Windsor Castle, and many other aerial attractions.

Those wishing to become eligible for the prizes are asked to apply to Miss Nancy Price or Mr. J. T. Grein, at 10, Buckingham Street, Strand, W.C.2, by November 20, and on November 22.

A meeting of all the Founder Members and subscribers will be held at the Hanworth Air Park.

After tea in the club-house at the Hanworth Flying Club, there will be a debate on the plans of the People's Theatre.



A new low wing Monoplane in this country is the Caudron ("Renault," 95 h.p.), which is the property of H. Swann, of the L.C.C., who is believed to be the first member of that august body owning his own aircraft. (FLIGHT *Photo.*)

GLIDING

THE LONDON GLIDING CLUB.—The following lecture programme has been arranged :—

Wednesday, November 19 : "The Theory of Flight," by Captain F. T. Hill, F.R.Ae.S., M.I.Ae.E., B.Sc.

Wednesday, December 17 : "Soaring Bird Flight," by Sir Gilbert Walker, F.R.A., F.R.A.S., M.A.

Wednesday, January 7, 1931 : "Early Aviation" by E. C. Gordon England Esq., A.F.R.Ae.S., M.I.M.T.

Wednesday, January 28 : "Glider Construction," by C. H. Lowe-Wylde, Esq., A.R.Ae.S.

All the above lectures will commence at 6.30 p.m., in the Library of the Royal Aeronautical Society, 7, Albemarle St., W.1. As far as accommodation permits, members of all clubs affiliated to the British Gliding Association will be welcome. No tickets will be issued.

KENT GLIDING CLUB.—On Friday, October 24, the Chairman and Hon. Secretary, with other members, represented the Club at the funeral, in Canterbury Cathedral, of their late President, Dr. Whitehead Reid. A wreath was sent by the Club in his memory.

There was no Club gliding meeting on Sunday, October 26. On Friday evening, October 31, Fl.-Lt. Charles Crawford gave a highly interesting lecture on "The Principles of Flight." The lecturer, who was one of the original council members of the British Gliding Association, and has for years taken a keen interest in gliding and soaring flight, explained in simple language the various components of the glider and their uses. He then dealt with "the whys and hows" of elementary gliding. The thanks of the Club are due to him, who is also one of the Club's honorary instructors, for a very interesting and useful evening. This lecture formed the first of a series which have been arranged during the winter months.

Col. the Master of Sempill has done the Club the very great honour of becoming its new President, and on Sunday last, November 2, he and Miss Susi Lippens attended the meeting. The meeting was held at a site at Harrietsham, Kent, by kind permission of the owner, Mr. Rea. The Master of Sempill, who had recently been down and had helped the Club to find a more favourable site than the one at Lenham, tested this new site with The British Aircraft Co.'s Intermediate type machine. Although the weather made gliding in the morning impossible, and the afternoon was interspersed with violent thunderstorms and showers, a very enjoyable afternoon's gliding was held, and both the Master of Sempill and Miss Lippens seemed to think the new site held distinct possibilities.

It is hoped arrangements can be made to use the site permanently.

NORTH KENT GLIDING CLUB.—Owing to the inclement weather last Saturday, no flying was possible at the opening day, but a lot of spectators braved the elements, probably between 200 and 300, and had it been fine, no doubt there would have been many more. The day had been extensively advertised, besides which, the programme was an attractive one. Many people were disappointed, and those concerned in making the arrangements were hit rather badly ; however, the club has been instrumental in getting the Autogyro, to give a display on their ground at Joyce Green Aerodrome next Sunday, at 2 p.m., weather permitting, and this will no doubt please many. The club will do some gliding as well.

STOCKPORT GLIDING CLUB.—A further meeting in connection with the above was held in Crossleys Café on Tuesday, October 28.

As there were many more present than the previous week, the details of last week were outlined and the cost of gliders, insurance and the general running of a glider club were put forward.

It was agreed that there were many who were wanting to join, but who were holding back until something definite was done. The first step in this direction was to secure a suitable room, sufficiently large to be able to build a glider in, to be as central as possible in order to be accessible for the members, who were from all sides, and even outside of the town.

The next step was to try and secure a president, and probably a number of vice-presidents, but this matter was left over for a week or so, until the club had secured the room and definitely settled down to work on the construction of a glider.

The meeting closed with a resolution that each member present do make himself responsible to secure particulars of at least one room, then at the next meeting, to be held on the following Tuesday, November 4, at the same place, they could decide which room to have and settle down to work in earnest. Also to issue an appeal to all interested in gliding to come to the next meeting, or get in touch with the Secretary, J. T. L. Mallard, of Sandy Lane, Tel. 3445, for further particulars.

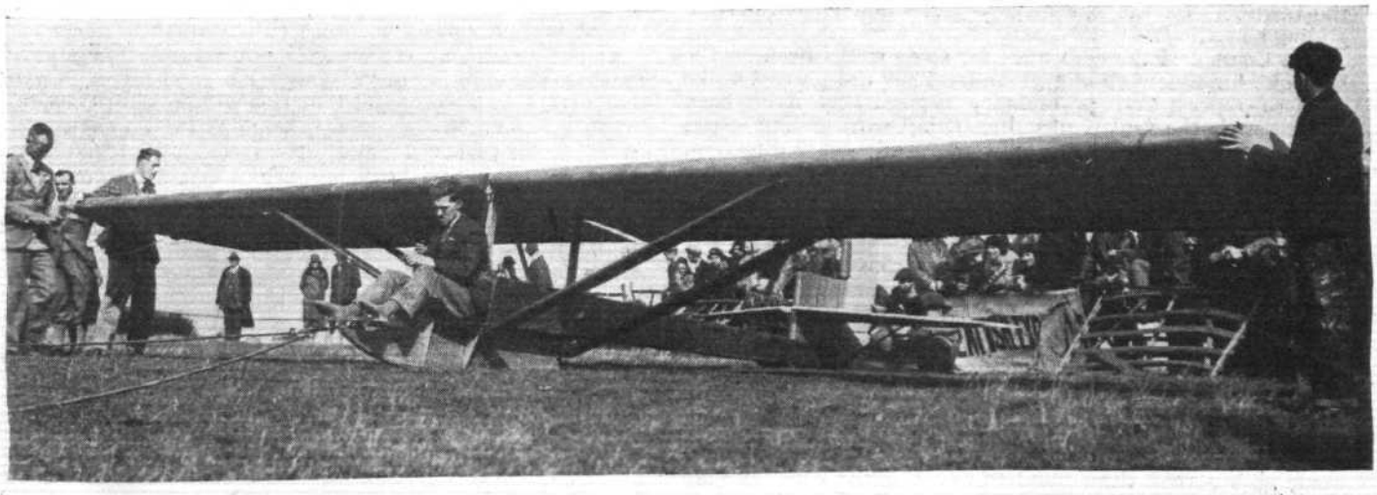
THE NOTTINGHAM GLIDER CLUB.—A short history to date. The first properly constituted meeting of this club was held on March 28, 1930.

There had been numerous meetings prior to this date, and Mr. A. Logelain was the prime mover in the organising of these early meetings.

Major S. A. Currin, the President of the Club, was one of the first enthusiasts, and he advanced the necessary cash for the purchase of the R.F.D. Glider.

The first gliding meeting was held on Sunday, May 11, at Oxton, by kind permission of Capt. Sherbrooke of Oxton Hall. It was a bitterly cold and wet day and an enthusiastic little band spent most of the day in erecting a glider they had never seen before.

Major Currin was launched first and crashed from about



The new intermediate training type glider, built by the British Aircraft Co. at Maidstone, being flown by its designer, Mr. Lowe-Wylde. (FLIGHT *Photo.*)

30 ft. He sustained a fractured thigh and is still feeling the effects, although as keen, or keener, than ever.

Glider insurance was unknown in those days, as also was personal accident cover for pilots, but now the club has made the necessary arrangements and would be happy to arrange cover for other clubs and glider pilots.

The following week-end the glider was again ready, and Mr. Marcus Manton kindly came from London and gave a demonstration to the delight of about three thousand spectators.

Next was a " slight misunderstanding " with some of the local people regarding Sunday gliding, so the club found an excellent " schooling field," with very favourable and varying slopes, at East Bridgford, where glides of from 13 to 18 sec. were obtained; but the hedges were always " too close."

It was at this gliding ground that the mechanical release made by Mr. H. A. Searby, was first used on June 8. It is sure, certain and strong, and a child of 12, can and does find it simple in operation. This release obviates the necessity of anyone sitting on the (perhaps wet) ground, which means that extra persons are available for other duties.

Some excellent sport has been obtained with only six members present; that is, one for the combined duties of wing tip holding and release, two on each " bungy " and one pilot.

Mr. Searby, the inventor, would be pleased to supply a replica of this labour-saving device, and details of this offer can be obtained by writing to the Hon. Secretary of the club.

On September 6 and 7, in conjunction with the Matlock Gliding Club, a display was given at Carsington Pastures in Derbyshire, at which Herr Magersuppe gave several demonstrations on a " Professor " type sailplane.

On Saturday, September 6, rain fell in torrents and only about two thousand people attended, but, on the next day, before 6,000 spectators, many long glides were made by several members of the Nottingham Club from the crest of the three hundred foot hill in the club's R.F.D. Glider, Mr. M. H. Leed eventually " roosting " in a tree. Lt. W. Spaight, piloting the " Searly Special " made a fine glide with two " S " turns, of nearly 40 sec. duration and qualified for his " A " certificate. The club has unfortunately lost this talented member, as he has he had to proceed to India.

It was on this day that Mr. H. A. Searby, on his " Searby Special," a machine designed and built by himself, flew into a crosswind and had a slight crash. This machine incorporates several interesting features, one of which is that lateral control is obtained by the warping of the wings instead of by ailersons. Mr. Searby used this method on an aeroplane which he designed and built as long ago as 1910.

The Chairman of the B.G.A., Mr. Gordon England, and Mr. Waplington, the Secretary, came from London for this demonstration, and, being but recently returned from the Wasserkuppe Competitions, was able to give the members some very interesting first-hand information.

The club was invited by the National Flying Services, Ltd., to give a demonstration of gliding at both the opening meeting of the new Tollerton Aerodrome and also at a subsequent display.

Tollerton Aerodrome is of necessity practically flat, but the demonstration delighted the much lamented late Director of Civil Aviation, Sir Sefton Brancker, who congratulated the members on the fine display given under such adverse gliding conditions.

The Council of the club have for some weeks been on the look-out for a new gliding ground. They are pleased to be able to report that preliminary negotiations have been opened with the tenant of a 100-ft. hill with gliding slopes and very fine landing grounds in practically every direction. This is Winkin Hill, which lies between Gotham and Sutton Bonington, and is on the estate of Lord Belper.

On October 12 test flights were made, one of over three hundred yards.

On October 19, the glider was again conveyed to Winkin Hill for further tests to be made. After erection, however, the wind caught the glider under the wings, and, before it could be held, had blown it over backwards.

This bent the tail booms, and, of course, rendered the tests impossible (other clubs beware the enthusiasm of spectators and their " help ").

The club, however, have a wonderful and, they believe, unbeatable record. They claim that their R.F.D. glider has made no less than three hundred actual glides (this does not include a very large number of " schooling slides " given to new members), and, with the exception of the first gliding meeting, when Major Currin was the victim of over-zealousness, the glider has never been out of commission for more than one hour.

There had naturally been many crashes whilst obtaining the three hundred actual glides, principally due to heavy landings, and this wonderful record speaks volumes for the sturdy construction of the R.F.D. glider, and also for the adaptability and inventiveness of the members. Fortunately, Mr. Searby is a keen and enthusiastic member, and it is principally due to his efforts that the club is able to claim such a record.

There was a further gliding meeting held on Sunday, October 27 at Winkin Hill, which drew a large number of the public. After a short test flight by the Capt. of the Day, three members had one glide each, all of which would have qualified for an " A " certificate had any of the club's B.G.A. official timekeepers been present.

The first, by Mr. Searby, with only three men on each " bungy," gained height and cleared two hedges and a road. The distance travelled being nearly a quarter of a mile.

The second pilot was Mr. W. S. Bullivant, and, he, apparently, was under the impression that he would not clear the two hedges and road, so made a right banking turn, and came to earth in the launching field.

Mr. L. Burbidge made the next flight, which was the steadiest of the three. He zoomed down in a most masterly fashion, to just skim the ground to gain speed to clear the road. Unfortunately, he lost flying speed after clearing the first hedge and road, landing in the field with one wing just resting on the second hedge. This did very little damage beyond the breaking of two landing wires, one or two tears in the fabric and a secondary rib in the aileron was broken. The members then decided to turn their attention to the " Searby Special," which has been considerably improved since its first public appearance at Carsington Pastures.

Only short hops were attempted, and the machine showed great promise. Mr. Searby (like all inventors) was *not quite* satisfied with one little point, and, by the time he has really finished improving his machine, here and there, it is more than probable this primary glider will have developed into an advanced " Searby Cloud Soarer."

Mention should be made of the camp established at the " Schooling Ground " at East Bridgford, and anything from twelve to twenty enthusiastic members rolling up for breakfast on Sunday mornings during the summer, also of the terrific amount of real hard work which has been done by about six members of the club to get it advanced as far as it is at the moment, but they say " it was worth it," so that is all that matters.

There are several lady members, who are making progress and who are very willing workers.

The club is very desirous of obtaining a workshop large enough to house a fully-rigged machine, so that they can commence building an intermediate type during the coming winter months.

The subscriptions are :—

Associate member's annual subscription, 10*s.* 6*d.*; gliding member's entrance fee, 10*s.* 6*d.*; gliding member's annual subscription, £1 11*s.* 6*d.* The hon. sec. is Mr. L. Burbidge, c/o the Welbeck Hotel, Nottingham.

THE ESSEX GLIDING CLUB.—This club, which was inaugurated in May, has put in some good training work at its present ground at Havering Park Farm, Havering-Atte-Bower, and previously at Hog's Hill, Hainault.

As the ground at Havering is not suitable for advanced training, the club is negotiating for a good hill at Nazeing, and there is every prospect that this will be secured soon.

This ground offers much more scope to those members who are ready for their " A " and " B " tests and it is hoped that there will be quite a large number of certificates earned by the time the spirng is here.

At a recent general meeting, members voted that gliding should be discontinued for the time being, and that construction of an intermediate machine should be concentrated upon.

With this end in view the club has secured the use of an excellent workshop at Chingford with the kind assistance of Mr. J. Bass, a member.

The constructional section is open to all members and construction is under the direction of Mr. W. R. Bannister.

The entrance fee and annual subscription are 10*s.* 6*d.* and £1 1*s.*, respectively, and full particulars may be obtained from the hon. secretary, Mr. F. E. Darlow, 17, Randolph Road, Walthamstow, or the hon. assistant secretary, Mr. R. S. Collins, 13, Clarendon Road, Leytonstone, Essex.

CORRESPONDENCE

[The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.]

AIR-COOLED ENGINES AND THE DO-X

We have received from Mr. Thomas, a director of the Bristol Aeroplane Co., Ltd., of Filton, Bristol, the following :—

[**2344**]. A certain amount of adverse comment on air-cooled engines has been occasioned by the fact that the Dornier Do-X machine, in preparation for its demonstration flight to the U.S.A., has had its original Jupiter air-cooled engines replaced by Curtiss Conqueror water-cooled engines.

As these comments are evidently based upon an incomplete knowledge of the relative facts, the following resumé of the authentic information available on the performance of the original engines and the reasons for the change of power plant should remedy this deficiency.

The engines used were of the geared Jupiter type, similar to those produced by the Bristol Co. up to 1928, and were manufactured in Germany by the Siemens and Halske Co. under sub-licence from the Bristol Co.'s direct licensees, Messrs. Gnome et Rhone.

Both tractor and pusher engines were of the standard tractor type, reliance for the satisfactory operation of the pusher engines being placed on the extra slip-stream cooling provided by the tandem arrangement of engines.

While this arrangement was, obviously, not ideal, impartial testimony to the satisfactory results finally obtained is given by Dr. Claude Dornier in his paper read before the German Society, Wissenschaftliche Gesellschaft für Luftfahrt, from which the following quotations are extracted :—

" One of the most difficult matters for us to decide was the choice and arrangement of the engines. We took two years to decide the question as to whether the engines should be water or air-cooled and as to how they should be installed—independently, in the wing, or in the boat. The fact that we ultimately decided upon the present arrangement signifies only that I regarded this solution, both then and now, as the best compromise.

" It was found during the first flights that the temperatures of the oil and of some of the cylinders of the rear engines were higher than they should be. Difficulties of that kind were anticipated, as similar symptoms had occurred in the development of each new type. We succeeded comparatively soon in bringing the oil temperature down to the extent that was necessary, but a greater number of flights was needed before satisfactory cylinder temperatures were obtained. We were hampered in our endeavours to improve the cooling by the lack of absolutely accurate temperature-measuring instruments."

The Dornier Co., having sold the licence for the Do-X machines in the U.S.A., a demonstration flight across the Atlantic was deemed desirable. For this purpose the use of American-built aero engines was, from the commercial and political points of view, of the greatest importance.

As a result of these considerations and a review of the proved high-powered American aero engines available, the 600 h.p. Conqueror engines were selected to replace the 500-h.p. Jupiter engines, the 20 per cent. increase in horse-power being of advantage in ensuring an easier time for the engines and compensating for the extra weight involved by use of water cooling.

" FRIGHTFULNESS OR CIVILISED WAR "

[**2345**] On p. 932 (Vol. XXII, No. 33) of your journal of August 15, 1930, with reference to Germany's method of warfare in the World War, you have made a few comments which are not consistent with the facts, and which prompt me to ask you to be good enough to allow even an ex-enemy, on the principle customary among fair-minded people, *audiatur et altera pars*, to state the case by placing at his disposal space in your paper for a few lines, by way of reply.

First of all, you mention the alleged bombardment of Rheims Cathedral by the Germans, a bombardment which, owing to the partly false, partly exaggerated propaganda of the French, has assumed the form of a sacrilege on the part of the Germans. On the basis of German Army Orders, I can furnish you with the proof that the Cathedral of Rheims was spared by us so far as at all possible. For the time being, I will content myself with sending you an extract from the novel *L'Abordage*, by the French writer, winner of the Balzac prize, a son of the well-known Admiral Albert Touchard, who was himself commander of a French battery at the siege of Rheims.

You go on to speak of the German frightfulness, and seem to be unaware that the blockade declared against Germany, as proved by medical statistics, cost the lives of 800,000 German women, children and elderly persons, while only 30,000 seamen lost their lives through the German submarines.

It was not the Germans who first conceived the idea of using gas, for already, in 1914, the French infantry brought into the field a gas rifle grenade, the sole purpose of which was to diffuse asphyxiating gas.

Nor did we establish a deliberate regime of frightfulness in Belgium in order to subdue the population, but our troops, at rest and on the march, were, in hundreds of cases, treacherously attacked in localities where there were no enemy troops, and which were apparently peaceful. It was for this that our men practised reprisals. There are sufficient proofs available to prove how things were in reality, and not, as suggested to the world by the war propaganda of our enemies.

Berlin, LT.-COL. FONCK (retired).
October 2, 1930.

The extract from the novel *L'Abordage* referred to, is as follows :—

Extract (page 29) from the novel " L'Abordage," by Albert Touchard, 1926. Published by Bernard Grasset, Paris.—

". . . Lord ! This Cathedral of Rheims and this martyred city have been cast up to us often enough," said Werner to himself, as he leaned on the ruined balustrade of Castle Polignac, which commands the whole white city, straggling at the foot of the hill, in a golden dust, under a June sky . . .

" But, my good people, so thoughtless and charming, if you did not wish to have your regal city destroyed why cram it full with batteries ? Rather, consider : In this undulating country, 300 mètres from St. Remy, 900 mètres from the Cathedral—the factor of dispersion must, however, be reckoned with—' Clovis,' a long-range piece of marine ordnance, spotted by the enemy, battered, ripped open, but still thundering, still standing, in the centre of the district which it had devastated, among the ruins of houses sacrificed to the insatiable divinity of the Faubourg Dieu-Lumière . . . !

" In this very spot, the entire hillside and the Parc des Sports bristling with guns and thick with casemates, to say nothing of the batteries drawn up all along the canal . . .

" The Cathedral ? Still standing, nevertheless, and crucified beneath a vast heaven of blue, never before had it appeared so august, so noble, as in suffering . . .

" The city ? A joyous riot of uniforms and gaily coloured dresses, quivering in a burst of laughter ; officers' chargers shaking their glittering curbs, in front of the market baskets adorned with moss roses . . . ' Blue Collars '* and poilus accosting the girls and going off with them arm in arm to the wineshops with their displays of succulent ham, to be washed down with this natural wine of Champagne, so fresh and fine, which fills the very heart of June with gay and shining blossoms . . ."

* Chasseurs à pied.

[We are quite ready to publish the letter of Lieut.-Col. Fonck, but we are not prepared to admit the validity of his arguments. The fact remains that Rheims Cathedral was bombarded, and that the bombardment caused a shock to others beside the Indian officer whom we quoted. Naval blockade has always been recognised as a legitimate measure of civilised war, and we do not include such measures in the term " Frightfulness." That the French first used a gas rifle grenade we have no evidence beyond the statement of our correspondent, nor do we propose to open our columns to a discussion on the point. The fact remains that the general use of gas on the Western front (it was not used on any other front) was due to the German gas attack on Ypres on April 22, 1915. We made no particular allusion to Belgium ; but we hold to what we wrote, namely, that the doctrine of " Frightfulness " may be " traced to the teachings of the worst of the Prussian militarists in the great war."—ED.]

CLASSIFICATION

[**2346**] In the correspondence columns of your current issue, Mr. J. B. Palmer asks what hope of promotion there is for him now that he has reached the giddy altitude of a "What-Not." And this after he has already passed from the ranks of the " Air-Scared " to the select circle of the " Air-Minded " !

He is too modest. Surely he realises that by reason of his three long trips with Imperial Airways and Deutsche Luft Hansa he has qualified as a " Three Star What-Not." May he soon become a whole galaxy and by his enthusiasm sweep up all his friends and relatives into the vortex.

How else are we at Croydon to earn our bread and scrape ? Please assure him that we stand on the Air Port doorstep welcoming him in.

Your Croydon Correspondent.
Croydon, M. L.
October 27, 1930.

AIRISMS FROM THE FOUR WINDS

Another Flight to Australia Completed

MR. OSCAR GARDEN—a young Scot from Sutherlandshire—who returned from Australia on holiday earlier in the year, after having been in business there and in New Zealand for the past eleven years, became greatly interested in aviation and purchased Mr. Gordon Selfridge Junior's D.H. Gipsy Moth, which he re-christened " Kia-Ora," being Maori for " Good Luck." He learned to fly at Norwich and so apt a pupil did he prove that he was quickly proficient and decided to endeavour to fly his machine back to Australia—and has succeeded in doing so in 18 days. He left Lympne Aerodrome on October 17, and as will be seen from the following schedule made such good progress that on reaching Calcutta he was only one day behind Mr. Bert Hinkler's time, namely, eleven days against Mr. Hinkler's ten days. The day lost was due to being held up at Constantinople through what appears to be the usual difficulties with permits covering landing in Turkey, notwithstanding he had the necessary documents. After leaving Allahabad, Mr. Garden made a forced landing at Jhansi on his way to Calcutta and the slight repairs necessary delayed him for another day at this point. Mr. Garden used Smith's instruments, Hewson compass, K.L.G. plugs and Vacuum oil. His daily progress was as follows :—

October 17, Lympne-Munich ; October 18, Belgrade ; October 19, Constantinople ; October 22, Aleppo ; October 23, Baghdad ; October 24, Bushire ; October 25, Jask ; October 26, Karachi ; October 27, Allahabad ; October 28, Calcutta ; October 30, Rangoon ; October 31, Singora ; November 1, Singapore ; November 2, Batavia ; November 3, Sourabaya-Bima ; November 4 (18th day), Kupang-Wyndham (5 p.m.).

The R.A.F. West African Flight

THE formation tour of a flight from No. 47 (Bomber) Squadron, from Cairo to Bathurst and back, is the most ambitious tour ever made in West Africa. The flight consists of three Fairey III F aeroplanes with Napier " Lion " engines and is under the command of Sqdn.-Ldr. L. Howard-Williams, M.C. The formation started from Khartoum on October 19, the distance from which place to Bathurst in the Gambia colony being 3,300 miles. On the first day the flight reached El Fasher, in the Sudan. Next day it flew to Geneina, then to Fort Lami, and on the 22nd reached Kano, in Nigeria, where a few days were spent. Kano is the limit hitherto reached by R.A.F. flights in West Africa. Thereafter the stages were to Sokoto, Niamey, Ougadougou, Bamaco, and Tambacounda. Bathurst was reached on Monday, November 3. The flight is due to start back to-day, November 7, and is due to Khartoum on November 21.

Portuguese Flight to India

CAPT. MOREIRA CARDOSA and Lt. Sarmento Pimentel, two Portuguese airmen, left Lisbon on November 1 on a flight to Novagoa (Portuguese India). They will fly by way of Oran-Algiers, Tunis, Tripoli, Gabes, Benghazi, Todruck, Alexandria, Gaza, Baghdad, Basra, Bushire, Karachi, Diu and Novagoa. They arrived at Tunis on November 4.

Mrs. Victor Bruce

THE Hon. Mrs. Victor Bruce, who is flying to Tokio in a Blackburn " Bluebird," has been making steady progress. She left Calcutta on October 30, and, flying in company with Mr. Oscar Garden, who was flying to Australia, reached Rangoon that afternoon. Proceeding next day she flew to Bangkok, after a difficult journey across the mountains, and on November 1 continued on for Korat and Honoi. Owing to bad weather, however, she had to turn back, and landed in a field at Lakhom. She hoped to reach Tokio on Sunday.

" Miss Columbia's " Berlin Trip

CAPT. ERROL BOYD and Lt. Connor, who recently crossed the Atlantic in the Bellanca monoplane *Miss Columbia*, left Croydon in that machine for Berlin on October 30. They carried as passengers Miss Maisie Proctor and Miss Vivian Stayner. The return flight, which started on November 3, was interrupted at Brunswick and Amsterdam *en route*, owing to bad weather.

Italian Flight Round Africa

THREE Italian airmen, Comt. Mazzotti, Lt. Lombardi (of Rome-Tokio fame), and Engineer Rasini, left Rome on October 31 in three Fiat A.S.2 machines *en route* for Cape Town and round Africa. They reached Tobruk on November 1.

Mapping Spain from the Air

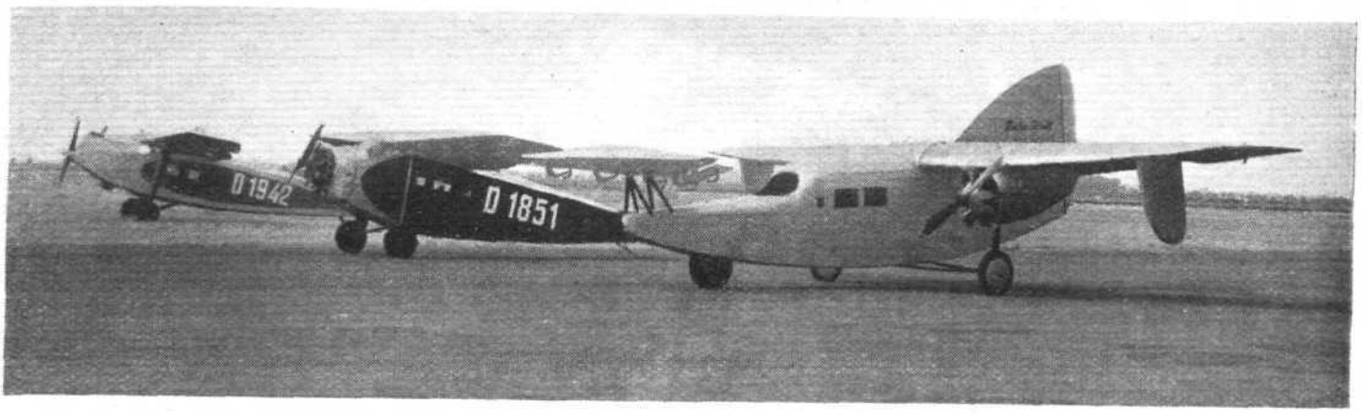
THE Spanish Government is considering a scheme for an aero-photographical survey covering more than one-half of the total area of Spain. It is estimated that an aerial survey can be made in a quarter of the time taken by ordinary methods. The maps, when complete, are to be used as the basis for levying land tax on all property in Spain. Sr. Gabriel Badell, an official of the Spanish Ministry of Agriculture, is at present in London, where he has been discussing the scheme with British aero-photographic experts. " There is," he stated in an interview," a possibility that the contract for the Survey may be secured by English enterprise. I have discussed the aerial survey with experts in Germany, Great Britain and France," he added. " I shall now return to Spain and make my report to the Government. A meeting will be held in Madrid shortly to decide upon final arrangements. It is estimated that a complete cadastral survey of more than one-half of Spain can be made from the air in about ten years ; to map the same area of millions of acres by ground-methods would take forty or fifty years. I am much impressed with the excellence of the British apparatus for aerial photography, which I have seen at Hendon. My discussions with representatives of British firms have been most interesting."

Third " Round Poland " Flight

IN the following results of the Third " Round Poland " Flight, it will be noticed that British aero engines make a brave show—especially the " Cirrus " engines. The pilots, aircraft and engines, respectively, were placed as follows :—Zwirko, R.W.D.4 (Cirrus-Hermes) ; Grzeszczyk, R.W.D.4 (Cirrus-Hermes) ; Giedgowd, J.D.2 bis. (Armstrong-Siddeley Genet) ; Lewoniewski, P.W.S.52 (D.H. Gipsy) ; Izycki, R.W.D.4 (Cirrus-Hermes) ; Soltykowski, R.D.W.4 (Cirrus-Hermes) ; Orlinski, P.Z.L.5 (D.H. Gipsy) ; Szczepanik, M.N.5 (Armstrong-Siddeley Genet) ; Sido, S.1 (Cirrus M.III) ; Stefaniuk, P.W.S.51 (Armstrong-Siddeley Genet).

THE ATLANTIC VETERAN: The Bellanca monoplane "Miss Columbia," which has made three Atlantic crossings, is now operated by Personal Flying Services, Ltd., of London, for air taxi work, etc. Our picture shows it at Croydon prior to Capt. Boyd's flight to Berlin this week. (FLIGHT *Photo.*)

AIR TRANSPORT



THREE RECENT FOCKE-WULF TRANSPORT 'PLANES : The A.32 " Bussard " six-passenger cabin monoplane (280 h.p. Junkers " L-5 "), the A.33 " Sperber " for three passengers (145-h.p. Walter " Mars "), and the F.19a " Ente," the interesting " tail-first " machine.

SOME RECENT TRANSPORT 'PLANES

NEW designs of aircraft for commercial air transport are, on the whole, few and far between in this country —a type is designed, produced, and then run for years on some particular air route. Abroad, both in Europe and America, however, aircraft designers are constantly bringing out new types to meet the requirements of various services. This week we illustrate some recent German and American commercial machines, suitable for various classes of work, which possess several interesting individual features.

At the top of this page we show three successful machines produced by the Focke-Wulf Flugzengbau of Bremen—the A.32 " Bussard," the A.33 " Sperber," and the F.19a " Ente." All are monoplanes, the " Bussard " and " Sperber " being of the high-wing type, and the " Ente " being the interesting and unusual " tail-first " type—with the experimental model of which FLIGHT readers are already familiar.

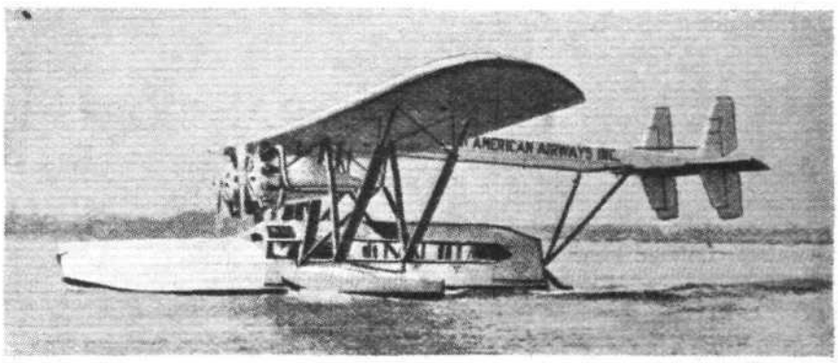
The " Bussard," which is fitted with a 280-310 h.p. Junkers " L-5 " engine, is intended principally for passenger work on medium services up to 360 miles, such as are usual in the European air traffic. Ability to undertake abnormally long flights has been abandoned in favour of economy, with the result that this machine can carry two pilots and six passengers with 300 h.p.

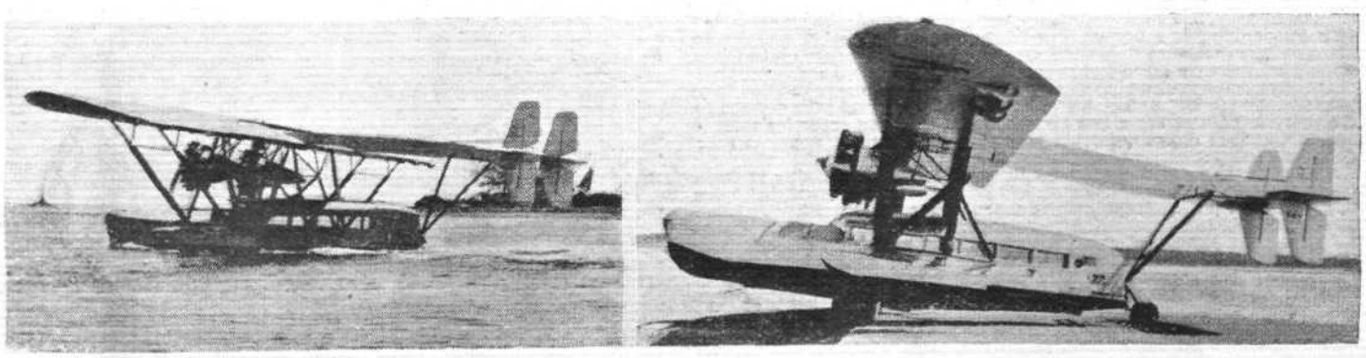
The full cantilever wings—of thick section tapering from root to tip of typical Focke-Wulf " Zanonia " or taube shape—are in one piece and of all-wood construction, including the covering. Welded steel tubes, on the other hand are used for the construction of the fuselage, the covering being sheet metal at the engine section, plywood for the cabin, and the rest fabric.

As regards performance, the " Bussard " has a maximum speed at ground level of 119 m.p.h., a cruising speed of 101 m.p.h., and a landing speed of 50 m.p.h. It climbs to 3,280 ft. in just over five minutes and to 9,840 ft. in 24 minutes.

The " Sperber " is a smaller edition of the " Bussard " and represents the latest design in small commercial aircraft produced by this firm. It is intended for light passenger traffic or taxi work, and accommodates pilot and three passengers. The engine is a 145-h.p. Walter " Mars " nine-cylindered, air-cooled radial. Constructionally the " Sperber " is much the same as the " Bussard " except that the wings are covered with fabric and plywood. It has a speed range of 46–103 m.p.h., the cruising speed being 90 m.p.h., and climbs to 2,200 ft. in eight minutes. Its ceiling is 9,850 ft.

As regards the " Ente," we do not propose to say much





Three views of the new Sikorsky S.41, a large amphibian, similar to the well-known S.38, which has been supplied to Pan-American Airways.

Another Sikorsky : The S.39, a smaller version of the Sikorsky Amphibians, fitted with a 300 h.p. Pratt and Whitney "Wasp Junior" and carrying pilot and four passengers. This machine has been supplied to Personal Flying Services, Ltd.

about this interesting machine here, as we hope to publish details of it in a future issue of FLIGHT. We will only mention that it is the commercial development of the experimental model produced some time back, previously described in FLIGHT. It has also received its German equivalent of the "C. of A.," for carrying passengers "for hire and reward."

Our next three illustrations show the latest American Sikorsky amphibian, the S.41—claimed to be the largest amphibian in the world—which has recently been delivered to Pan-American Airways for service in Central and South America. The S.41 is an externally braced monoplane-cabin flying boat with retractable landing gear, powered with two 575 h.p. Pratt and Whitney "Hornet" engines. It carries nine to 14 passengers, in addition to a crew of two, and has ample space for luggage and mail.

The design of this new amphibian follows generally, on a larger scale, that of the S.38, which has been extensively employed on American air routes for some time past. The S.41 retains all of the aerodynamic advantages of the S-38, with the addition of several improvements, but differs from the S.38 in the absence of the small lower plane extending from the hull. At the moment, performance figures for the S.41 are not available.

Finally, we illustrate another recent Sikorsky production—the S.39. Although primarily built to meet the demands of the individual private owner, the S.39—which is a much smaller, single-engined edition of the two above-mentioned models—is also suitable for small passenger services or taxi work.

In fact, the actual machine illustrated has just been supplied to Personal Flying Services, Ltd., of 90, Piccadilly, London, W., and Croydon, a comparatively new British concern (the head of which is Mr. D. S. Cottingham) which operates air taxi services, special chartered flights, etc., and about which we hope to have something more to say on a future occasion.

As will be seen, the S.39 follows the general lines of the other Sikorskys, being a high-wing monoplane with metal cabin-hull and retractable landing gear. The cabin, accommodating pilot and four passengers, is exceptionally roomy and comfortable.

The S.39 is fitted with a 300 h.p. Pratt and Whitney "Wasp Junior" equipped with a self-starter, and has a speed range of 48 to 122 m.p.h., the cruising speed being 100 m.p.h. Further details of this machine must wait for a future issue of FLIGHT.

AIR TRANSPORT IN FOG

AN important paper dealing with the problem of flying in fog was delivered before the R.Ae.S. by Mr. F. W. Meredith, B.A., on October 23. The author was unable to go fully into all the aspects of this problem, and therefore confined himself to a discussion on the feasibility of operating heavier-than-air craft in fog with reference to the instrumental equipment required. We cannot, in the space at our disposal, give Mr. Meredith's paper in full, but the following summary will, we hope, record its outstanding points.

Until recently, said Mr. Meredith, it was generally regarded as impracticable to continue flying in a heavier-than-air craft when the pilot was unable to see a sufficient distance to identify his position and avoid such obstructions as buildings, trees or hills—and pilots had a reasonable dislike of losing sight of the ground and preferred to fly low until visibility became so bad that they were forced to land. Lately, however, much attention had been devoted to the problem both at home and abroad, and it had been suggested that, if certain technical difficulties could be surmounted, aircraft would at once defeat the greatest enemy of all transport.

There was, he pointed out, a vast difference between the ability to fly in fog and the advisability of doing so, and he took as his criterion that flying in fog was only justifiable if it did not materially increase the risk of accident. In such circumstances as crossing the Atlantic, where one may be compelled to fly in fog, the reliability of the equipment need not approach perfection. When, however, one considered the policy of flying deliberately in fog, the question of risk assumed a vastly different complexion, and it became essential that the methods employed should be infallible and that the equipment should be comparable in reliability with a railway signalling system.

Fog did not form rapidly enough to catch one unawares, if its beginning or probability was instantly reported over a wide area, unless one had to cover large distances between landing grounds. It followed, therefore, that on such a route as Croydon-Paris, fog flying was avoidable and the risk, the extra cost of carrying the necessary equipment, and the costs of the ground organisation, must be offset against the advantages of maintaining a regular service. As a compromise it might be desirable to maintain a restricted service in fog with specially equipped aeroplanes. On long distance routes, however, fog flying might be unavoidable, and safety might require that provision should be made for this emergency, regardless of cost, if the service is to be maintained.

With regard to the special equipment required, the problem naturally divided itself into two parts, *i.e.*, flying "blind" to one's destination, and landing. Any pilot with a little practice could fly an aeroplane in fog by the aid of the airspeed indicator, the compass and a turn indicator. For many years automatic control of the rudder by a servo motor, itself controlled by a gyroscope had been available and that was capable of flying a normal aeroplane with only occasional direction by the pilot, who was thus freed from the strain and allowed to devote his attention to the navigation and other matters. Experience had shown that, provided the aeroplane was stable longitudinally and had a normal amount of dihedral, the other controls might be ignored even in rough weather. The aeroplane might wallow, but its stability was assured. Gyroscopic apparatus capable of controlling both the rudder and elevators had now been developed and tested fairly extensively in the Service.

The author then briefly described a pitch and bank indicator supplied by the Sperry Co. for experiments carried out by the Guggenheim Fund, an "artificial horizon" instrument designed at Farnborough, and a similar electrically-driven instrument produced by S. G. Brown, Ltd.

To be able to fly straight was, however, of little advantage in fog unless one reached one's destination, and wireless in some form was absolutely essential. To distinguish that part of the problem from the landing, the lecturer said he would assume that one required to arrive within a mile or so of the landing ground. The radio methods known for that purpose came under four headings: (1) direction finding on the ground; (2) direction finding in the aeroplane; (3) track indicating system; (4) rotating beacons; and these Mr. Meredith briefly described. He did not wish to say which of those radio systems was to be preferred, but there could be no doubt that that part of the fog flying problem did not present serious difficulty in the present state of knowledge.

He next dealt with the most difficult part of the problem—landing. This demanded a very high accuracy in fixing one's position in order to land within

the limited space provided in an ordinary aerodrome. One solution had already been provided by the Guggenheim Fund—that previously referred to. The "Leader cable" provided another possible solution, but in practice it was difficult to follow, particularly when it was curved and the air was bumpy.

It was probable that the complete solution of the fog landing problem would depend upon the ordinary wireless receiver for leading the aeroplane over the landing ground and for fixing the moment when the engine should be throttled back, the height being fixed by a barometric altimeter. Much had been said about other methods of measuring height, such as timing echoes, acoustic or radio, or measuring variation in the electrical capacity, but it was safe to say that the barometric method was capable of giving a much higher accuracy than was required for fog landing, provided that the ground barometric reading be communicated to the pilot.

Mr. Meredith described some recent experiments which had been carried out at Farnborough :—

"These experiments were intended to investigate the practicability of landing through a fog of limited height, guided by a balloon moored above the fog. The work included a determination of the magnitude of the errors of the positioning of the landing and a demonstration with a standard Lynx Avro, by Flight-Lieut. Oddie and Mr. Sudworth, in an actual fog. It was necessary to develop safe methods of taking off and of flattening out which could be used even if the ground were invisible.

"Taking off presented no difficulty whatever with the assistance of the pitch and yaw indicator. It and a simple form of ground proximeter, to be described presently, were the only special instruments carried on the aeroplane. For taking off the tail skid was placed on an inclined ramp and secured by a wire to a bolt which could be withdrawn by a person on the ground after a signal from the pilot. The attitude of the aeroplane on the ramp was chosen to correspond with the attitude on a slight climb. By releasing the gyroscope in this position, the pilot was provided with a datum in lieu of the horizon, as well as the means of keeping dead straight.

"The flattening-out manœuvre might have been rendered unnecessary had a special undercarriage been designed to absorb the downward momentum of the glide. Such a solution is, however, not likely to recommend itself to nervous passengers, and it was known from previous work that a semi-automatic landing could be achieved by the aid of a ground proximeter. It had been shown that an aeroplane approaching the ground at an assigned speed (estimated at about 20 per cent. above the stalling speed), would reach the ground flying horizontally at the stalling speed, if full elevator were applied at an assigned height. It remained to determine accurately the speed and height for the particular aeroplane we were using. This was done by analysis of accelerometer records taken in the aeroplane while the manœuvre was repeated at a safe height from various gliding speeds near the predicted speed.

"The ground proximeter consisted of a weight suspended 13 ft. below the wheels by a length of linen thread attached to a trigger controlling lamp circuits. As long as the weight was suspended, a green lamp showed and when the weight hit the ground, the increased tension in the thread switched on two independent red lamps with independent dry batteries and circuits. Two feet on the length of the string was allowed for the pilot's lag in responding to the signal.

"About 100 landings have now been made by this method, the necessary precision of flying during the approach being attained by the aid of the pitch and yaw indicator. Three different pilots have found that there is no difficulty in the manœuvre unless there is sufficient wind to produce a marked wind gradient. To meet this difficulty, which always produces a loss of flying speed as the aeroplane approaches the ground (provided, of course, it is landing up wind), it is desirable to add a couple of miles an hour to the speed. Slight excess speed when the ground signal occurs is easily allowed for easing forward of the control column after it has been pulled hard back and the only result is an increase in the distance required to come to rest.

"To facilitate the transition from level flight to the glide, the pitch and yaw indicator was pivotally mounted and attached to a double-acting pneumatic ram, which was controlled by a tap placed beside the throttle lever. Thus, once the stop on the ram had been correctly adjusted, the pilot was able to rotate the instrument in pitch through the gliding angle as he closed the throttle and by flying to keep the indicator central, he placed the aeroplane at the correct attitude for the glide. Any error in the datum of the indicator was apparent on the airspeed indicator and the pilot was able to correct it by flying with the pitch indicator slightly displaced.

"To start the glide from the balloon, the pilot proceeded as follows. The assigned course was set on the compass before leaving the ground. The pilot first ascertained the engine speed required to fly level at the assigned speed, and, having noted his height when alongside the balloon, he arranged to fly away from the aerodrome on a course parallel to the assigned course and sufficiently far away to allow for the turn of 180 deg. After flying level on this course for about a mile and a half, he turned the aeroplane and flew straight towards the balloon until the compass had settled after the turn. He then corrected his course by the compass when close to the balloon and released the gyroscope of the pitch and yaw indicator. He then manœuvred until he was alongside the balloon (moving the throttle if necessary to adjust his height) and simultaneously closed the throttle and moved the tap to alter the pitch datum. After that, he merely had to keep the pitch and yaw indicator central until he received the signal to pull the control column hard back.

"The gliding angle was calculated from the measured rate of descent. After allowing for the wind, the balloon height and compass course were adjusted so that the weight should strike the ground at an assigned position in the centre of the aerodrome. The wind was measured in some cases by the standard meteorological method, and in other cases it was estimated from the angle of the balloon cable. A table of balloon heights and compass courses was prepared, allowing also for the horizontal displacement of the balloon from the winch. Thus, once the wind had been estimated, little time was required for the final adjustments.

"After fifteen practice landings had been made with the balloon at heights varying from 370 to 420 ft. according to the wind, it was considered safe to take off and land in a low fog, as long as an observer on the top of the balloon shed was clear of the fog; this precaution was necessary to ensure that the balloon, which was too small to lift a man, was above the fog. On the morning of June 18, 1930, the weather conditions were suitable at sunrise and five landings were made through a fog estimated at 90 ft. in depth. The visibility in the fog was variable, but the pilot was not able to observe the ground after entering the fog.

"The maximum errors of all the landings made from this height were 95 yards in range and 50 yards in line. A few tests were made with the balloon at a height of 750 ft. These indicated that the errors were about double those with the balloon at 400 ft. It would appear, therefore, that on any reasonably large aerodrome, landings could be made by this method through a fog extending up to about 700 ft., provided that the ground personnel could ascertain that the balloon was in clear air. This could be ensured by using a man-carrying balloon, or by providing instruments capable of giving the necessary information. May I suggest that the design of such instruments would be an interesting and fruitful occupation for persons of an inventive turn of mind who are interested in the problem of fog landing?

"I have described this recent work at some length, because it would appear that this solution would deal with a large proportion of the fogs proper which impede flying in this country, and also because the method can be applied with little modification with any radio device for fixing the start of the glide instead of the balloon.

"The risk could be still further reduced if the ground personnel controlled by radio the height of each aeroplane. In any case it was now generally recognised that efficient blind flying instruments were an essential part of any aeroplane's equipment. Wireless was no less essential. Thus, the special equipment required for the densest fog should not amount to more than the sensitive aneroid, the reed indicator (if, for example, the equi-signal beacon system be used), and the ground proximeter."

It had been suggested that fog flying would never be practicable on account of the risk of collision. Although there was little prospect of the development of equipment capable of giving adequate warning of the approach of another aeroplane in a thick fog, any development which enabled aeroplanes to go up in bad visibility, instead of operating at a common height (*i.e.*, the maximum height from which their pilots could view the ground), would materially reduce the risk of collision. It would be advisable to reserve specific heights for each line of traffic and thus reduce the risk to that of one aeroplane overtaking another, when the relative speed would be so low as to give the overtaking pilot a reasonable chance.

Concluding, Mr. Meredith said, "that air transport in fog is immediately practicable, but that it involves an element of risk which will continue until all the equipment required has been proved by many years of actual use. In the meantime the policy should be to press on with the development of the necessary instruments, to equip aeroplanes for landing in fog when they are travelling such distances that they may be enveloped before reaching a possible landing ground, but to avoid flying in fog whenever possible. My neglect of the subjects of fog dispersion and of infra-red rays as a means of seeing through fog, is an indication of my view of the utility of such suggestions in the present state of physical knowledge."

An Air Port for Dublin

A WELL-KNOWN Irish architect, Mr. A. Delap, in a letter addressed to the *Irish Times* recently, suggests that a part of Dublin Bay be enclosed by a wall approximately 2½ miles in length, behind this wall half the space could be reclaimed from the sea for use as an aerodrome, and the other portion used as a flying-boat base. The water, in the section of the Bay which Mr. Delap suggests should be enclosed, is shallow, so no great expense would be incurred in the reclamation scheme. There is, says the writer, no high land to interfere with flight in any direction. Fog, he admits, is the chief difficulty to the scheme, as that prevalent in Dublin Bay is usually low-lying.

Ford Airlines Carry 10 Million Pounds of Freight

FROM the Dearborn Aeroplane Division of the Ford Motor Co., under date of October 23, 1930, comes a Souvenir, per Air Mail, commemorating the 10 millionth pound freight carried by Ford Airlines in America—Congratulations!

Apropos Ford air transport 'planes—two of which are giving demonstrations in this country—we understand that 12 of the "5-AT-C" models have been supplied to Southern Air Fast Express, Inc. (S.A.F.E.), the subsidiary of American Airways, reference to which was made in last week's issue of FLIGHT.

Imperial Airways Machine Crashes

ON Thursday, October 30, a Handley Page W. 10 machine, named the *City of Washington*, which had recently been re-equipped with two Rolls Royce "F" engines, while flying from Le Bourget for England, crashed in a fog on a hill near Neufchatel. There were three passengers on board, Mr. Street, an American, and Messrs. H. Bolsover and F. B. Tomkins, of the staff of A. V. Roe & Co., Ltd. The crew consisted of Mr. J. J. Flynn, pilot, Mr. F. H. Mason, mechanic, and another employee of Imperial Airways, Mr. A. C. James, was also on board. Messrs. Street, James and Mason were killed, and Mr. Bolsover died afterwards in hospital. Messrs. Flynn and Tomkins each had to have a leg amputated. Mr. Tomkins showed great bravery in crawling a mile with his damaged leg to get help.

The G.A.P. and A.N. Lectures

THE navigation lectures which, as we announced last week, would be held under the auspices of the Guild, by kind permission of the Air Ministry, at Gwydyr House, throughout the winter, started on Tuesday evening. Some 20 aspirants to the second-class navigator's ticket attended and Mr. Collins had a keen and appreciative audience for his first night. The first few lectures will, of necessity, be of an elementary character, since many of those attending, even if they have the necessary mathematical knowledge, have forgotten it, and these preliminary lectures will serve to refresh their memories with the essential matters concerning logarithms and trigonometry. The regulations require a navigator to be an "X" chaser in a small way and without such lectures as these there is no doubt that many people who have been out of touch with such matters—while having turned their attention to flying matters—would find a great deal of difficulty in passing the examination. The regulations as to what is required of a navigator seem to warrant close investigation and next week we shall have something more to say about this.

R 101 INQUIRY

The Question of Loss of Gas

THE Inquiry into the loss of R 101 by Sir John Simon and the Assessors (Professor C. E. Inglis and Lieut.-Col. Moore-Brabazon) was resumed on Wednesday, October 29. Continuing his opening speech, the Attorney-General (Sir William Jowitt) dealt with the decision to make the trial flight (after the lengthening of the airship) one of less than 24 hours. This curtailment was sanctioned by Air Vice-Marshal Dowding (Air Member of Supply and Research), at the request of Wing-Commander Colmore, provided that Major Scott was satisfied with the behaviour of the airship. Though the suggestion came from Cardington, it was pointed out that the Secretary of State all the time was pressing the Cardington people to push on with the departure for India. Sir William mentioned that Sir John Higgins, the former Air Member of Supply and Research, had told Air Vice-Marshal Dowding that Colmore could never err on the side of rashness. The new Air Member went on the trial flight himself, and had reported on it. He said that all the officers were quite serene. Next Sir William described how Colmore and Air Vice-Marshal Dowding then had an interview with Lord Thomson to arrange the date for starting for India. Lord Thomson asked if Friday evening was possible. Colmore objected to this, and also to Saturday morning, as he wished to cross France by night when he expected better weather conditions, and also he did not want to reach Ismailia before sunset. Lord Thomson then said "You must not allow your judgment to be swayed by my natural anxiety to get off quickly." The Air Member then suggested to Colmore that, as there had been no full-power test on the trial flight, such a test should be made on the actual flight to India while still near home, so that they could return if anything went wrong. A diary of Lieut.-Commdr. Atherstone, first officer, was produced, and an extract was read, in which the officer remarked of the trial flight "Ship appeared to me to be better in the air than before." Air Vice-Marshal Dowding's report of the conversation with Lord Thomson was corroborated by some notes made by Mr. Reynolds, private secretary to the Secretary of State. A certificate of airworthiness was issued to the ship on October 2. The Court asked on what report it had been granted, as Professor Bairstow had had nothing to do with the engines. The Attorney General replied that he had not yet had time to go through all the papers.

Turning to the question of weather, Sir William said that before the start there was nothing to suggest that the wind would change so that the start would have to be delayed. Dr. Simpson (Director of the Meteorological Office) had reported that at the moment of the crash the barometer was reading almost the same as at Cardington, so that the navigators would have no difficulty in determining their height. The ship reported her height and temperature when over Abbeville, from which it had been possible to calculate the height of the ship just before she crashed. Taking the normal variation, it would be 1,600, according to Dr. Simpson's report, and it could not have been less than 1,100.

Sir William said that it was unlikely that the ship was in difficulties from the weight of rain, as she had reported that she had begun to recover water ballast. From first to last there had never been anything in the nature of an S.O.S.

A statement made by Rigger Church before he died was then read. He said that he received an order to release an emergency forward water ballast of half a ton, but before he could get to it the crash came.

After summarising the evidence which the survivors would give, the Attorney General said that the Preliminary Investigation Commission had concluded that no part of the main structure of the ship broke in the air.

Thursday, Oct. 30

Sir Stafford Cripps, Solicitor-General, addressed the Court, A report from Flight-Lieut. Irwin on three flights previous to the R.A.F. Display at Hendon was referred to. He mentioned flapping of the outer cover, a number of small holes in a gasbag, and a loss of gas too great to be accounted for by these holes. He suggested that the flapping of the cover might have opened the valves. A valve was produced in the Court and its action was explained.

Professor Bairstow, chairman of the Airworthiness of Airships Panel, was then called. Sir John Simon said that there was no need for too much elaboration of his evidence. If the ship did not break in the air, there need be no issue about her structure being strong enough.

The Attorney-General intervened to produce the engine log of car unit No. 4 (the port midship engine) which had been picked up in France. Engineer Cook, a survivor, had been in charge of this engine at the time of the crash. The last entry was at 2 a.m., and the log showed that the engine had been running normally throughout at cruising revolutions.

Friday, October 31

Prof. Bairstow continued his evidence, and agreed to make more wind-tunnel tests to satisfy requirements of the Court.

The next witness was Engineer A. J. Cook, who was in charge of No. 4 engine unit (port midship) at the time of the crash. He had just taken over from Blake. He found the engine in order. About five minutes later the ship went into a slight dive, and the engine-room telegraph rang for the engine to be reduced to slow. As he turned it to slow, the ship began a very much steeper dive. He put his head out of the car, and then the ship struck the ground. He stopped his engine at once, and then came the second crash, followed by an explosion. His car did not strike the ground on the first impact. He thought he was trapped in the car, but he pushed aside a girder that had fallen outside the car and jumped out. His hands were badly burned.

Mr. H. J. Leech, foreman engineer, next gave evidence. He said there was nothing abnormal in their start. He thought they crossed the Channel at about 700 or 800 ft. They had some trouble with oil pressure in the aft engine, which was put right. At the time of the crash, he was alone in the smoking room. The first dive which he would say was about 30 to 35 degrees, caused the glasses to fall off the table, and he slid up against the forward bulkhead. He thought this dive continued for three-quarters of a minute. Then the ship flattened out. He picked up the glasses and put them on the table. Then she dived again. He thought this was at a less angle. Then he heard the telegraphs ring, about two seconds before she struck. Then the lights went out, and there followed a flash of flame. There was not a violent explosion, just a "woof," with no concussion. The flame appeared to come from the control car. The colour of the flame impressed him, as it was very white; not like a hydrogen flame. There was thick smoke in the smoking room. He tore away a settee and got down into the hull on the starboard side. Below him were the windows, which had fallen from the lounge, and they were blazing. He forced his way through those.

On the voyage, he noticed that gasbags 8A and 9 were surging, but that was due to the draught from the ventilators.

Mr. A. Disley, the wireless operator, said that he was in charge of the electrical gear. About 10 p.m. he went to the control car to speak to the wireless man on duty. Lieut.-Commndr. Atherstone took the wheel from the flight coxswain and pulled the ship up from 900 to 1,000 ft., and then gave the wheel back, saying, "Don't let her go below 1,000." Later he went to bed, and woke when the ship went into a dip. She then straightened out, and then the chief coxswain came in and said "We are down." The coxswain then left in the direction of the crew's quarters. Then the ship took a final dive, and he heard the telegraph bell ring. He got up. The ship hit the ground and then the lights went out. There was an explosion from in front of him, but it did not throw him off his feet. He turned off one of the electric currents, but had not time to press the second switch. There was no master cut-out in the control car.

Engineer V. Savory said that he was in the starboard midship car. He got no signal to slow down. He only remembered one dive.

Monday, November 3

Engineers V. Bell and J. H. Binks, who were both in the rear engine car, gave evidence. Binks came to relieve Bell at 2.5 a.m., and the latter remained talking with him. On the second dive, which both said was not so steep as the first, they got the order to slow the engine, and Bell did so. When the ship hit, water came pouring over them, and they got out of the car.

A contour map of the district was produced with the crash marked on it. The nose and tail were both on the 100-metre contour line, but the centre was over a slight depression. The wreck was heading S.S.W, which was not on the ship's course.

Major Cooper, Chief Inspector of Accidents at the Air

Ministry, described his search for pieces of wreckage. He said there was no ground at all for supposing that the ship broke in the air.

Six French witnesses then described what they saw of the crash. Rabouille, the poacher, declared that the ship dived only once. He was blown down by the force of the explosion.

Tuesday, Nov. 4

On Tuesday, the principal witnesses were Major Cooper, Inspector of Accidents, Wing-Commander T. R. Cave-Browne Cave, who was responsible for the engine installation on R 101, and Dr. Hope Simpson, Director of the Meteorological Office. At a previous session the report of the microscopic examination of the broken elevator cable had been presented, the report showing that the cable had probably broken after the outbreak of fire. Engineer Cook was recalled to speak on this point, and he said that after escaping from his car he saw the port elevator in an upward position. Major Cooper was of opinion that the elevator was functioning at the time of the crash. Major Cooper said that very few saplings had been broken by the crash, which must have been gentle.

Wing-Commander Cave-Browne-Cave said that on the trial flight on June 26, the airship had to drop about two tons of oil fuel. At the time of the crash, if oil were released when the ship was less than 1,000 ft. up, the oil would have fallen under the wreckage. Sir John Simon remarked that there was no reason to believe that the captain did not take advantage of his emergency oil ballast.

Dr. Simpson said that the weather conditions had been very carefully worked out. The ship had been warned that in North France she would probably meet a wind of from 40 to 50 m.p.h. At the time of the crash the wind was about 30 m.p.h. over Beauvais. There was nothing about the weather experienced which would have given the navigators cause to worry. The ship would have met worse weather about four hours later. She did not run into an unexpected thunderstorm. He was sure the weather was no worse than the officers had visualised.

A minute was handed to the Court written by the late Sir Sefton Brancker on the subject of the weather he encountered when flying over Beauvais in February, 1928. Dr. Simpson thought that eddies on the ridge would only make the air bumpy. The Inquiry will be continued.

THE MEOPHAM ACCIDENT

THE Air Ministry has published the following interim report on the accident to Aeroplane G-AAZK at Meopham on July 21 last, which they have received through the Chairman of the Aeronautical Research Committee (Accidents Investigation Sub-Committee)* :—

**Membership.*—Lieut.-Colonel M. O'Gorman, C.B. (Chairman), Professor L. Bairstow, C.B.E., F.R.S., Major J. S. Buchanan, O.B.E., Mr. G. B. Cockburn, O.B.E., Sir R. T. Glazebrook, K.C.B., F.R.S., Professor B. M. Jones, M.A., A.F.C., Sir J. E. Petavel, K.B.E., F.R.S., Professor A. J. Sutton Pippard, M.B.E., D.Sc., M.Inst.C.E., Mr. H. E. Wimperis, C.B.E., and Mr. J. L. Nayler (Secretary). Squadron-Leader H. W. McKenna, D.C.M., was in attendance throughout the enquiry.

1. The enquiry was referred to the Aeronautical Research Committee on August 25, and the Sub-Committee for Accident Investigations began work on September 3. The first three meetings were held on consecutive days and others since at such intervals that the progress with experiments, investigations, and calculations has been continuous.

2. The aeroplane flying from Berck to Croydon crashed at Meopham, Kent, at about 14.35 hours, on July 21, 1930 (there was a strong westerly wind, gusty with storms of rain). In the neighbourhood of Priestwood it had been seen to fly into a cloud and very shortly thereafter the personnel, pieces of tail-plane, a wing, the engine, the fuselage and various items fell from the cloud and were distributed along a belt one and a-half miles long (east to west).

3. In general, the procedure of the Sub-Committee is directed to the discovery of the technical causes of accidents with a view to their prevention in the future, and for the above purpose in the present instance it became necessary to examine all the details of the accident. Among such are the position on the ground of each fallen object, and the probable path of its falling, having regard to the wind prevailing at the time, the nature of the fractures, the strength and condition of each element of the structure of the machine, the load each member was intended to bear and the maximum load which may have come on it during the accident, with much other relevant matter.

4. The procedure of the Sub-Committee is similar to that which has been successfully followed in many investigations of a like nature. The evidence considered relates to the resports of eye-witnesses, to distribution of the parts, to meteorological conditions, and to the histories of the pilots. On this evidence theories are advanced as to the probable first cause of the accident. The more plausible theories are subjected to criticism and tested where necessary, both by detail calculations and by experiments which may be lengthy.

5. It frequently happens in an investigation of this kind that some one specific cause, such as defect in material or an abnormal meteorological condition, is so clearly sufficient to account for the accident that it becomes unnecessary to investigate fully alternative explanations. In such circumstances, the enquiry can be brought to an early conclusion. In the Meopham accident, no such obvious cause has come to light, and the enquiry has perforce to proceed by the exclusion one by one of all reasonably possible causes. Only when this has been done is it proper to attribute the accident to some cause, which cannot from its nature be indicated by direct evidence, such as unforeseen meteorological conditions, or the manœuvres made by the pilot, or &c. Such a process, if carried out thoroughly, is essentially lengthy.

6. For the Meopham accident the available data have been collected and examined, and details as to the breakage of the structure are clear. The Sub-Committee are now in a position to state that careful examination of all main fractures has revealed no defect in structure or assembly. Further, there are no signs of faulty or inferior material in the fractures. The Sub-Committee are, therefore, looking for other possibilities.

7. As an example of the type of investigation still in progress, the Sub-Committee have to determine whether flutter can have been the cause of the accident. The experience of the Sub-Committee in the past shows that breakages in the air arise from time to time from flutter of the tail or of the wing of the machine. No evidence has been brought to the Sub-Committee of flutter of existing Junkers aircraft of the F.13 type, of which there are a large number in use; nevertheless, the possibility of flutter among other causes cannot be dismissed until the conclusion of experiments now in hand.

8. The Sub-Committee are aware that a definite conclusion as to the cause of the accident should be made available at the earliest possible date, but they think it undesirable to express an opinion, which must be provisional.

9. They desire to recognise the willing help they are receiving from the Junkers Company, from the Deutsche Versuchsanstalt fur Luftfahrt and from the staffs of the Royal Aircraft Establishment and at the National Physical Laboratory. They are also particularly indebted to Major J. P. C. Cooper, the Inspector of Accidents, for his detailed and accurate reports.

THE ROYAL AIR FORCE

London Gazette, October 28, 1930.

General Duties Branch

Flying Officer E. D. Mills, R.A.F.O., is granted a short service commn. as Pilot Officer (Oct. 20). The follg. Pilot Officers are promoted to rank of Flying Officer :—R. C. A. Brooke-Beer (Aug. 22); G. J. Pawson (Sept. 15); G. F. Alexander (Oct. 2); R. Ellison (Oct. 13). Flying Officer R. R. Bennett takes rank and precedence as if his appointment as Flying Officer bore date Dec. 28, 1928, immediately following Flying Officer L. S. Tindall on the gradation list. Reduction takes effect from Oct. 6; Flight Lt. A. J. E. Broomfield, D.F.C., is placed on retired list at his own request (Oct. 29); Flying Officer H. C. Johnson is transferred to Reserve, Class C (Oct. 17); Lt. C. W. Phillips, R.N., flying Officer, R.A.F., ceases to be attached to R.A.F. on return to Naval duty (Oct. 7); Flying Officer J. C. Allan resigns his short service commn. (Oct. 29); the short service commn. of Pilot Officer on probation P. W. E. Ryland is terminated on cessation of duty (Oct. 14).

Medical Branch

Flying Officer P. J. McNally, M.B., B.Ch., is granted a permanent commn. in this rank (Oct. 29).

Dental Branch

S. C. Allen, L.D.S., is granted a non-permanent commn. as Flying Officer with effect from and with seny. of Oct. 13.

Legal Branch

Sqdn.-Ldr. D. L. Ingpen is promoted to rank of Wing Commander (Aug. 11). Flight Lt. (acting Sqdn.-Ldr.) G. S. Marshall, O.B.E., is promoted to rank of Squadron Leader (Aug. 11).

Memorandum

178034 Flight Cadet W. B. Young is granted a n hon. commn. as Sec. Lt. with effect from date of his demobilisation.

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

C. Watson is granted commn. in Class A.A. (ii) as a Pilot Officer on probation (Oct. 15). The follg. Officers are re-employed with Regular Air Force for further year (Oct. 24) :—Flight Lt. F. Thomasson, D.F.C., M.M. Flying Officer L. A. Parker. The follg. Flying Officer on probation is confirmed in rank :—J. W. Rayner (Sept. 13). The follg. Flight-Lieutenants are transferred from Class A to Class C :—E. R. Maddox, M.C. (Mar. 24); G. Rose (Oct. 26).

Flying Officer H. E. F. Saunders relinquishes his commn. on completion of service and is permitted to retain his rank (Sept. 12); Flight Lt. W. E. C. B. C. Forsyth relinquishes his commn. on completion of service (Oct. 23); Flying Officer E. D. Mills relinquishes his commn. on appointment to a short service commn. in R.A.F. (Oct. 20); the commn. of Pilot Officer on probation. A. J. Hewetson is terminated on cessation of duty (Sept. 28).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (City of London) (Bomber) Squadron.—Pilot Officer H. O. Young relinquishes his commn. on account of ill-health (Oct. 29).

THE CRANWELL COAT OF ARMS

THE autumn issue of the "Journal of the Royal Air Force College" contains an interesting article on the new coat of arms recently granted to the College. Previously it had been satisfied with a badge, which was not very distinctive or distinguished, but it was felt that with the foundation of new buildings for the College the time had come to apply to the College of Heralds for proper armorial bearings.

A beginning was made by exploring the ancient history of Cranwell. The village appears in Domesday Book as "Cranewel," and in the twelfth century a family named "de Cranewel" owned land there. No trace of the family's arms was found until the time of the seventeenth century. In 1640 there was in the east window of Cranwell Church a coat of which the chief feature was three cranes close (*i.e.* with folded wings) argent (*i.e.*, silver). The connection between the names of the birds and the family is obvious. From this basis the bearings of the present College were built up.

It seemed best that the field and ground of the shield should be azure (heraldic blue), typifying the sky, its chief field of action. This had to be overlaid with a charge, and a chevron was chosen. The Royal status of the College made it necessary to find a place for the Royal lions, shown in or (gold). The cranes had to be argent (silver) for heraldic reasons, and it was decided to show them not "close" but "volant" (flying). For the crest was chosen the figure of Daedalus standing "proper" on a wreath of the two colours. In R.N.A.S. days Cranwell station was known as H.M.S. *Daedalus*. The motto "Superna Petimus" (We seek the things above) had previously been chosen for the College, it is believed by a former Chaplain, the Rev. B. W. Keymer, and it was retained.

The description of the arms in the warrant issued by the Garter, Clarenceux, and Norroy Kings of Arms reads :—"Azure on a Chevron between three Cranes volant Argent as many Torteaux each charged with a Lion's Face Or and for the Crest on a Wreath of the Colours a Figure representing Daedalus proper."

The illustration, which we have copied from the College Journal, was made by Flight Cadet Messenger.

⁂ ⁂ ⁂ ⁂

R.Ae.S. AND INST.Ae.E.

Hull and Leeds Branch

The following is the Lecture Syllabus for the 1930-31 Session of the Hull and Leeds Branch of the Royal Aeronautical Society. The meetings will be held at the University College, Hull, at 8 p.m. :—

1930.		
Nov. 28	..	"The Importance of the Boundary Layer." H. Glauert, M.A., F.R.Ae.S. (of the Royal Aircraft Establishment, Farnborough).
1931.		
Jan. 2	..	"Evaporative Cooling of Aero Engines." J. E. Ellor, (Chief Experimental Engineer of Rolls-Royce, Ltd.).
Jan. 30	..	"Gliding and Soaring." Col. The Master of Sempill, A.F.C., A.F.R.Ae.S.
Feb. 27	..	"Aircraft Light Alloys." H. Sutton, M.Sc. (of the Royal Aircraft Establishment. Farnborough).
March 27	..	"The Flying of High Speed Seaplanes." Sqdn.-Ldr. A. H. Orlebar, A.F.C. (of the Marine Aircraft Experimental Establishment, Felixstowe).

⁂ ⁂ ⁂ ⁂

Change in the Higher Command, R.A.F.

THE Air Ministry announces the following appointment :—Air Commodore Reginald Percy Mills, C.B., M.C., A.F.C., now Chief Staff Officer, Headquarters, Royal Air Force, India, to be Air Officer Commanding, Royal Air Force, Halton, and Commandant of No. 1 School of Technical Training (Apprentices) in August, 1931, *vice* Air Commodore Ian Malcom Bonham-Carter, C.B., O.B.E., on the latter completing his period of appointment.

No. 3 Squadron Royal Air Force, Officers' Re-union Dinner

THE eleventh annual re-union dinner of No. 3 Squadron R.F.C. and No. 3 (Fighter) Squadron R.A.F. will be held in the Oak Room of the Trocadero on Friday, December 5, 1930, at 7.30 p.m. for 8 p.m. The chair will be taken by Air Chief Marshal Sir John Salmond, K.C.B., C.M.G., C.V.O., D.S.O. Will all members who do not receive the special notice, shortly being sent round to individuals, apply to the Honorary Secretary for tickets before November 20. Tickets will be 12s. 6d. each, including gratuities, but exclusive of wines, and will only be available on application to the Honorary Secretary, and not at the dinner, as previously.

Kindly remit cash with application, to Honorary Secretary, Flight-Lieutenant John Oliver, No. 3 (Fighter) Squadron, Royal Air Force, Upavon, Wilts.

Royal Air Force Memorial Fund

The usual meeting of the Grants Sub-Committee of the Fund was held on October 16. Mr. W. S. Field was in the chair, and the other members of the committee present were : Mrs. L. M. K. Pratt-Barlow, O.B.E. ; Air Commodore B. C. H. Drew, C.M.G. The committee considered in all 12 cases, and made grants to the amount of £293 7*s.*

At the meeting, held on October 30, Mr. W. S. Field was in the Chair, and the other members of the Committee present were :—Mrs. L. M. K. Pratt-Barlow, O.B.E. ; Air Commodore B. C. H. Drew, C.M.G. The Committee considered in all six cases, and made grants to the amount of £119 4*s.* 6*d.*

⁂ ⁂ ⁂ ⁂

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda : No. 1317 (Ae.454).—Flight Tests on the Variation of the Range of an Aircraft with Speed and Height. By Flight-Lieut. C. E. Maitland, D.F.C., and A. E. Woodward Nutt. June, 1929. Price 9*d.* net. *No.* 1320.—Controllability at Low Speeds and Full Scale Measurement of Lift and Drag of Parnall "Peto" Fitted with R.A.F. 15 and R.A.F. 31 Section Wings (Slotted and Unslotted). By R. K. Cushing. Jan., 1930. Price 9*d.* net. *No.* 1325 (Ae. 459).—A Study of Polynomial Equations. By W. L. Cowley and S. W. Skan. Feb., 1930. Price 1*s.* net. *No.* 1329.—Maximum Force on Rudders. By F. B. Bradfield. April, 1930. Price 6*d.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

U.S. National Advisory Committee for Aeronautics Reports : No. 346.—Water Pressure Distribution on a Flying Boat Hull. By F. L. Thompson, Price 10 cents. *No.* 347.—A Method of Calculating the Ultimate Strength of Continuous Beams. By J. A. Newlin and G. W. Trayer. Price 10 cents. *No.* 348.—Strength of Welded Joints in Tubular Members for Aircraft. By H. L. Whittemore and W. C. Brueggeman. *No.* 349.—A Proof of the Theorem Regarding the Distribution of Lift over the Span for Minimum Induced Drag. By W. F. Durand. Price 10 cents. *No.* 350.—Working Charts for the Selection of Aluminium Alloy Propellers of a Standard Form to Operate with Various Aircraft Engines and Bodies. By F. E. Weick. Price 10 cents. *No.* 353.—Airfoil Pressure Distribution Investigation in the Variable Density Wind Tunnel. By E. N. Jacobs, J. Stack and R. M. Pinkerton. Price 10 cents. *No.* 357.—Aircraft Accidents : Method of Analysis. Price 10 cents. Errata Sheet for Report No. 342. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

⁂ ⁂ ⁂ ⁂

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations* : Cyl. = cylinder ; i.c. = internal combustion ; m. = motors. The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1929

Published November 6, 1930

17,815. DR. J. A. M. DE CARVALHO. Rotary i.c. engines. (313,413.)
21,348. GRAHAM AMPLION, LTD., and D. SINCLAIR. Helmets for aviators. (336,286.)
21,616. BRITISH THOMSON-HOUSTON CO., LTD., and T. H. KINMAN. (336,303.)
21,544. M. E.-DARE. Aeroplane construction. (336,297.)
31,157. H. JUNKERS. Device for taking up stress of bolts on engine casings, etc. (336,429.)
35,684. P. J. P. RATIER. Metallic propellers of variable pitch during flight. (336,479.)

FLIGHT, *The Aircraft Engineer and Airships.*
36, GREAT QUEEN STREET, KINGSWAY, W.C.2.
Telephone : Holborn, 1884 ;
Holborn, 3211.
Telegraphic address : Truditur, Westcent, London.

SUBSCRIPTION RATES POST FREE

UNITED KINGDOM		UNITED STATES		OTHER COUNTRIES*	
	s. d.				*s. d.*
3 Months	8 3	3 Months	$2·20	3 Months	8 9
6 ,,	16 6	6 ,,	$4·40	6 ,,	17 6
12 ,,	33 0	12 ,,	$8·75	12 ,,	35 0

* *Foreign subscriptions must be remitted in British currency.*

Cheques and Post Office Orders should be made payable to the Proprietors of "FLIGHT," 36, Great Queen Street, Kingsway, W.C.2, *and crossed "Westminster Bank."*

Should any difficulty be experienced in procuring "FLIGHT" *from local newsvendors intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.*